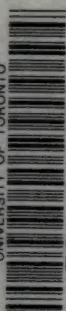


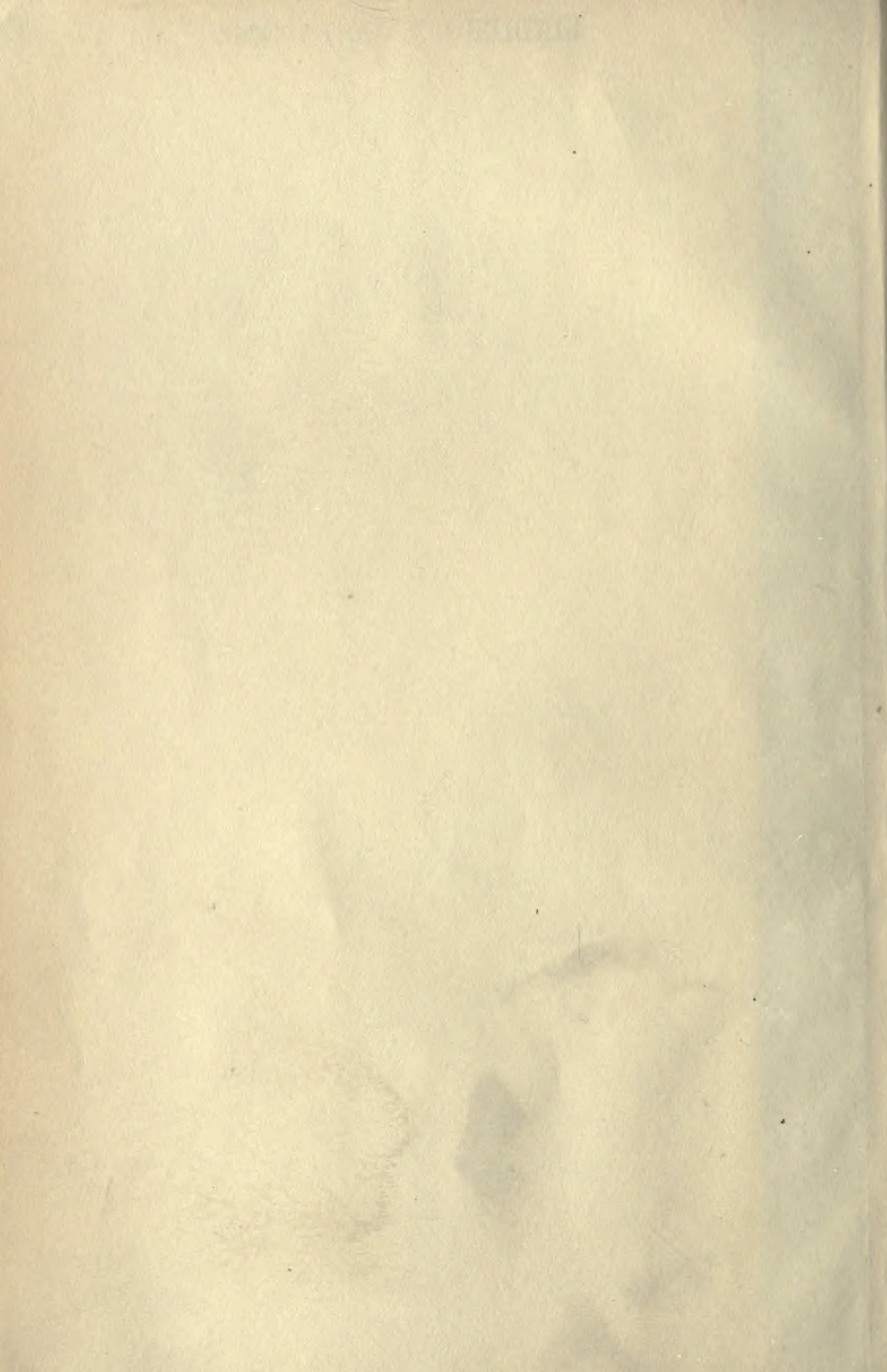
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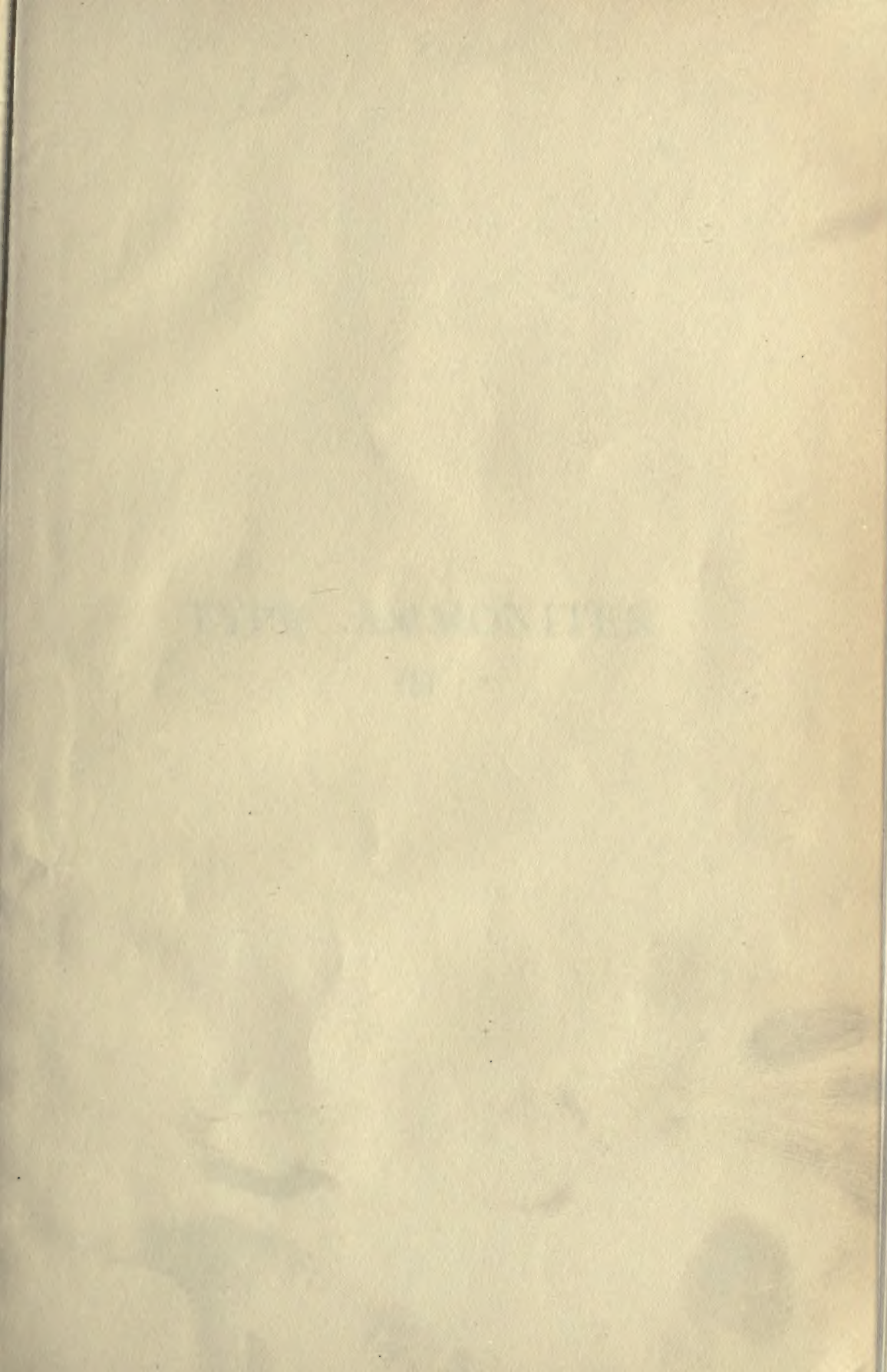


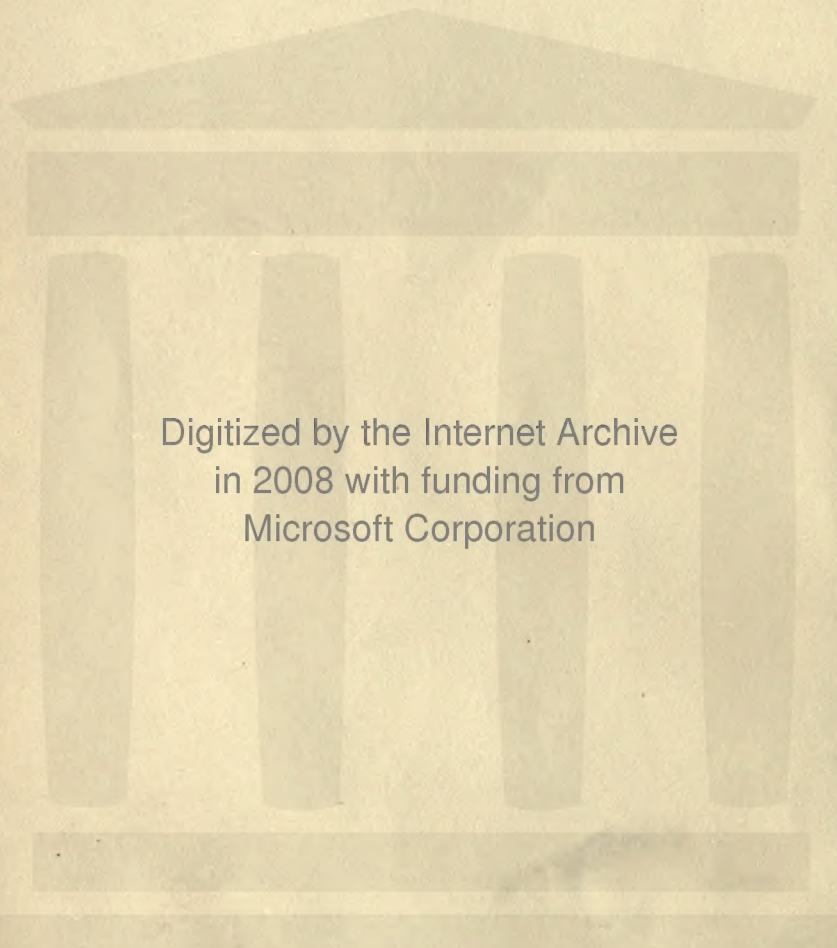
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TYPE AMMONITES

III

Additions to fauna decrease the imperfection of the zoological, but increase that of any local geological record: the gaps caused by destruction stand revealed more plainly

Paleont
B.

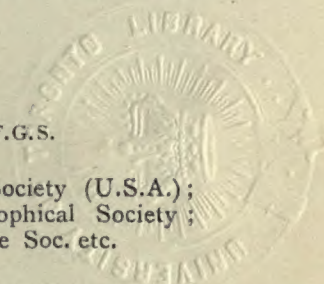
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TYPE AMMONITES

BY

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The illustrations from photographs by

J. W. TUTCHER

and

THE AUTHOR

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(Pp 1 64; Plates CXXXI CCLXVII¹⁹³₍₁₉₇₎; 3 Portraits

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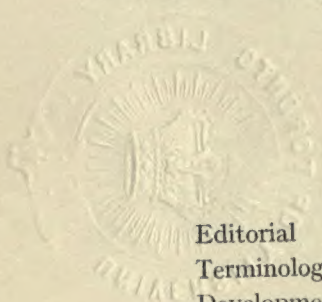
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With ~~177~~ Plates and 3 Portraits
193



Yours very obed.
humble Servt.
M. Simpson.

Whitby Museum }
March 30th 1854 }



JAMES BUCKMAN, æt. c. 30

From portrait painted by Miss P. N. Marshall, Cheltenham, c. 1844
 [*Ammonites strangewaysii*; J.B., Geol. Chelt. 1844, 90; "Dumbleton, Glos."
 "U.L." F. 240? (35), 30, —, 46; *Harp.* cf. *mulgravium*, Y.&B. See IV]

JAMES BUCKMAN, 1814-1884



vol. 3. 4³



Yours sincerely
S. S. Buckman

SYDNEY S. BUCKMAN, æt. 46
Maul & Fox, Ltd., Photo. 1906

S. S. BUCKMAN, 1860—

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TYPE AMMONITES

BY

S. S. BUCKMAN, F.G.S.

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Part XIX

Pp. 5, 6; 9 Plates and a Portrait

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And a portrait of
Martin Simpson *paged 4^a*

EDITORIAL

Part XIX of Type Ammonites, commencing Vol. III of the series, is now presented to subscribers. The courtesy of Mr. T. Sheppard, M.Sc., F.G.S., allows the addition of a portrait of Martin Simpson which has appeared in Proc. Yorksh. Geol. Soc. XIX, 1918, xxxv. This has not now been headed, so that subscribers may place it as a frontispiece to whichever volume of the series they choose.

As in the present volume the text must be very strictly limited, it is intended to supply deficiencies of description by detail (diagrammatic and otherwise) in the illustrations. This has the advantage of not only inducing greater strictness of observation, but of presenting the results pictorially, that is, in a language which is universal. If the plates themselves were perfect they should, with their legends, give all necessary details: descriptions should be superfluous. There will, however, be descriptive matter; but it will be held until depicted species have accumulated.

The legend of the plate is designed to give the following information: name or other identification; status as type, if it has such; references to protolog and photograph or other bibliographic details; locality and horizon according to original information—in quotation marks; collection; proportional formula; see Q.J.G.S. LXXIII, 1919, 315. At foot of plate will be given present name, presumed date and status. The date is to be read as—age, in Roman, hemera, in italic type. This dating system accords with a very detailed scheme, not yet complete: the Liassic portion is given in the Journal cited above, but even that may require elaboration. Two hemeral names with / between them imply that the species possibly occupied an intermediate date, which may be added in brackets.

TERMINOLOGY

In the legend is a further innovation—there is given in millimetres as “max. c. xyz” the presumed maximum size of the specimen with complete body-chamber added; this within square brackets indicates information from another, a more complete, example.

This information prepares for a scheme of recording the great variation which adult Ammonites make at different dates in regard to size—from a few to several hundred mm. Thus there are certain dates when Ammonites of large size flourished, and others when small forms lived—the maxima rising and falling like waves; and there are further cases of large and small Ammonites occurring in the same stratum—the juxtaposition may not necessarily imply synchronism.

In connexion with these data a concise Terminology is necessary, particularly in regard to small Ammonites. Specimens may be small as a matter of growth; but they may also be small because they have been reduced (1) by breaking off of outer whorls before deposition, (2) by similar breakage in the process of extraction, (3) by both causes combined. In practice it may seldom be possible to say which of these causes has operated; but distinction could be made by qualifying the

technical term by (1) geological, (2) artificial. Then Ammonites which are small by growth require much further analysis. The following technical terminology is proposed, applicable also to other organisms:—

Colomorph—small because reduced by breaking off of outer whorls by geological or artificial agents (κόλος, docked).

Micromorph—small by growth—auxologic diminutive (Hudleston, Jur. Gaster. Pal. Soc. 1888, 61)—subdivided:—

Brephomorph—small because young, ontogenetically immature—baby or foal stage (βρέφος, a foal).

Anamorph—small because phylogenetically immature—*Eohippus* stage—*Arnioceras miserabile*, *flavum*, etc. stage (Ana— of Anagenesis).

Phaulomorph—small because stunted, phylogenetically mature, but under-sized—Donkey stage (φαίλος, paltry, mean).

Catamorph—small because phylogenetically degenerate (? tarpan stage); *Schlotheimia lacunata* (and allies) stage; Criocone stage (Cata- of catagenesis).

Nomomorph—of normal, average, or customary size; hackney horse stage (νόμος, custom).

Megalomorph—of large size; shire-horse stage; giant stage (μέγας, great).

When the distinction between phaulomorphs and catamorphs is in doubt, it is suggested that they be referred to as nannoids (νάννος dwarf). The distinction is that the former are presumed to be derived directly from anamorphs, not having passed through a nomomorph stage, while the latter are the degenerate descendants of nomomorphs, or, like the cited *Schlotheimia* group, the final expression of a nomomorph stock. The African pygmies, the cat and the donkey, are respectively human, feline and equine nannoids: it is for zoologists to say if I read them aright as phaulomorphs and not catamorphs.

Among Lias Ammonites phaulomorphs are rare—*Cheltonia* is an instance, *Oxynoticeras* being the nomomorph.

Among Inferior Oolite Ammonites phaulomorphs abound, and many are unillustrated. They are usually incipient scaphiticones with fine development of the mouth-border, especially in regard to lateral auricles. The following are a few examples, with their respective nomomorphs:—

Nomomorphs	Phaulomorphs
<i>Cadomites</i>	<i>Polyplectites</i>
<i>Lissoceras</i>	<i>Cadomoceras</i>
<i>Stepheoceras</i> , etc.	<i>Normannites</i>
<i>Emileia</i>	<i>Otoites</i>

The theory that the forms now called nomomorphs are the females, and the phaulomorphs the males (Munier-Chalmas, 1892, Haug, 1893), encounters serious objections (1) that various periods lack phaulomorphs, (2) that they are not always found in the same localities as the supposed females, and (3) that there are not enough "husbands" to go round (Buckman & Bather, 1894); to which may be added (4) that they do not always occupy the same horizons.

Among the species now illustrated *Coroniceras bucklandi* and *Goliathiceras ammonoides* are megalomorphs, *Doidoceras cylindroides*, at present the geologically earliest of the *Stepheocerata*ceae, is a nomomorph: its corresponding phaulomorph is to be figured; *Labyrinthoceras perexpansum* and *L. intricatum* are colomorphs, but the latter is also, in comparison with the former in its complete state, an incipient catamorph, much on

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TYPE AMMONITES

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs mainly by

J. W. TUTCHER

Part XX

Pp. 7, 8; 14 Plates

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the down grade in regard to size. *Victoriceras victoris* and *Tutchericeras perfoliatum* are nomomorphs, somewhat reduced, however, in size by the loss of more or less outer whorl, but not so reduced as to be colomorphs. The same applies to the megalomorphs mentioned above: as species these and the oxynotoids are megalomorphs or nomomorphs; as specimens they are docked or truncated megalomorphs or nomomorphs respectively. *D. cylindroides* is a nomomorph requiring no qualification; but the examples of the species usually found are so much reduced that they are colomorphs.

There seems to be general agreement that the cone-terms initiated by Hyatt, revised and expanded in this work (I, p. xi, II, p. ix) are particularly useful, making for much brevity of expression. Experience shows that some cases of peculiar contour are not properly covered by the terms now in use, and further additions are therefore proposed as follow:—

Contracticone. The terminal portion of the cone contracts in thickness, not merely to proportionally less than a preceding part, but to actually less. The character is especially marked in certain phaulomorphs, as, for instance, in *Trilobiticeras trilobitoides* now figured (Pl. CXL), which in earlier whorls is a stout cadicone. But it is not confined to phaulomorphs: it is shown by the nonomorph cadicone *Emileia crater* (II, ix).

It is also a feature of sphærocones. Of necessity it is a character which requires a reasonably stout whorl for its basis.

Ellipticone. The regular increasing spiral of the outer edge of the volute is not maintained: it is accelerated and then reduced, making an ovoid or ellipsoid figure. This is shown in the platycone phaulomorphs *Cadomoceras cadomense* (d'Orbigny) and *Cyrtosiceras macrotelus* (Oppel). It is also to be observed in sphærocones of the genus *Otoites*, and slightly in *Sutneria*.

Goniocone. This is an exaggeration of an ellipticone. The outer edge of the conch runs out as if it intended to make a baculicone; but the inner edge is conservative to the sphærocone. The latter tendency prevails, and the outer edge is brought sharply back. The result is a conch with an angle—it is a pointed conch, be it noted, in the direction in which the animal would dart away from an enemy. The typical instance of a goniocone is (*Ecoptychius refractus* (de Haan) of the Callovian. Not quite so gonioconic a form is *Ecoptychius grossouvrei* Brasil, "Bajocien supérieur," Normandy. A similar form (S. B. Coll. 382) has been obtained from Broad Windsor, Dorset, from upper beds of Inferior Oolite (Vesulian, *c. truellii* or later).

Dr. A. Morley Davies, whose questions are most stimulating, asks whether it is correct to use the same cone-term for shapes which, though similar, have been arrived at along different routes. Logically it is not; and such distinction has been carried out in the terms for cone-stages proposed in Vol. I.: an ophiocone and a serpenticone express the same coiled form, but the former is pre- and the latter post-sphæroconic. So a sphærocone developed from a serpenticone, as in the Liparoceratidæ, and a sphærocone developed from a cadicone, which will presently be shown to be the origin of *Labyrinthoceras*, are two distinct phenomena. A persistent cadicone, as in the case of various Bajocian Coronates, is very different from the cadicone, with inner whorls platycone, of *Cadoceras*. But with our present knowledge, or rather, with the backwardness in the publication of what has been awaiting illustration this many years, it will be inadvisable to attempt too much analysis of terms relating to these subsidiary cycles (Vol. I, p. xii). It is always possible,

and will be fairly concise, if special particularity is thought essential, to describe, say, *Cadoceras* as platycone to cadicone, as short for commencing as platycone and changing sooner or later to cadicone; but it would not be correct to describe *Labyrinthoceras* as cadicone to sphærocone, for the cadicone stage has dropped out owing to tachygenesis, just as in much specialized Liparoceratids the serpenticone stage has done (Y.T.A. I, p. xiv). It would, however, be possible to describe *Labyrinthoceras* as sphærocone post-cadicone, and thus distinguish it from Liparoceratids described in certain cases as serpenticone to sphærocone, or in the abbreviated cases as sphærocone post-serpenticone. It is these abbreviated cases (saltative palingenesis, I, p. xiv) which may lead astray and give trouble in too fine analysis, until ammonite genealogy is much more fully illustrated.

On the other hand, it may be pleaded that some cone-terms in changeable species refer to no more than the outer whorl of the specimen under consideration. Such, at any rate, is the case with those now proposed: Ellipticone and Goniocone are only concerned with phenomena belonging to the last whorl of full-grown specimens; while Contracticone is usually concerned with the difference between the last part of the last whorl of a full-grown specimen and that of the preceding part, though there are cases where the reduction began earlier even than the last whorl.

Not all contracticones, it may be remarked, are incipient scaphiticones or scaphitoids: some are; and, on the other hand, many scaphitoids are not contracticones.

DEVELOPMENT

With the above and other terms for shape, and with the terms for size which have been proposed (III, 6), it is possible to make concisely some remarks on the supposed habits and development of Cephalopods, and especially of Ammonoids.

The early Orthocones utilising the gas-effusion, which resulted from temporary indigestion under the nervous apprehension of danger, found that a cone thus made more buoyant was a help in rapid retreat from foes. They brought the feature to perfection—a systematic gas-generator and containing chambers. But retreat from foes was only incidental: bottom-crawling in search of food was the normal occupation. As the orthocones increased in size fear of foes was less insistent; but the gas-plant was still of service to lighten the load of the superincumbent conch. Now progress through the water would cause a certain amount of drag on the vertical conch, giving it a slant: there would then be tendency to absorb test on the lower edge and to make more deposition on the raised edge. Persistence of this tendency would give some curvature to the conch, and would convert an orthocone into a cyrticone, then to a gyrocone. As both these stages would be inconvenient for bottom-crawling or for darting away, there was good reason to hurry development into the ophiocone: then the conch, coiled in contact, would be more compact, and would be carried more easily, owing to the lowering of the centre of gravity. Darting away would still be possible, and, when ill circumstances coming again brought reduction in size and made such a habit again more frequent, it may be surmised that the cut-water peripheries of oxycones would be developed to facilitate rapid movement. Sharpened peripheries mean strict, presumably forced, economy—the attempt to attain the largest size, and to make the greatest show, with the smallest outlay of material.

It seems inadvisable to postulate quite the same habits for megal-

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morphs, nomomorphs and phaulomorphs: the first might have had no cause for retreat; the second might have had to retreat occasionally, and the last might have been in a fairly constant condition of darting away. Production of phaulomorphs instead of megalomorphs might have been brought about by over-population, by decrease of food supply, by increase of competitors, other than cephalopods, for the available food. Ammonoid phaulomorphs abound during Inferior-Oolite times, when the ammonite population reached its acme in numbers of species, of specimens, and almost of diversity; for there are aberrant forms evolved—criocones, toxocones and baculicones, possible attempts to find a solution of the problem of avoiding enemies, trying to attain again to the orthoconic condition, which, at any rate, so far as small forms were concerned, must have been fairly suitable for the purposes of rapid retreat. This tendency towards the orthoconic seems to have been hampered by ancestral traits of coiling cones trying to assert themselves; and thus when a fairly orthoconic development had been attained, ancestral characters revive in old age, and make for curvature again—the curious walking-stick crook at the end of a straight piece.

It is in the Cretaceous that the aberrant forms show the greatest development. This cannot have been because of over-population so far as Ammonite competitors are concerned, but it might, perhaps, have relation to the greater development of some other marine organisms.

The peculiar suitability of the shape of a goniocone for darting away has been already mentioned; but now comes an interesting question: in addition to side-lappets or auricles to the conch-aperture, this form has developed a sort of cowl-shaped rostrum on the median line of the periphery. Rostra of less developed patterns are a feature of oxycones; but many well-auriculate forms—cadicones, sphærocones, and their serpenticonic developments—lack the feature: with them the portion of the periphery connecting the auricles is neither sinuate nor rostrate, but annulate, that is, quite straight. With such periphery, or with simple rostra, there would be no interference with the action of the funnel; but the case is altered with an incurving rostrum. Is it surmisable that in such rostrate forms the funnel had been developed in duplicate, like the twin screw of a liner, acting not only for quicker propulsion, but making for more rapid turning?

It may be noted in regard to those forms which have developed lateral lappets with annulate connecting band that, in a sense, they have reproduced something similar to the hyponomic sinus of the Nautiloids; for the plan of the lappets and band make a U or sinuate curve." See *Trilobiticeras* and *Otoites*, Pls. CXL, CXLI.

Further remarks on the subject of Development must be held over until more progress has been made with the illustration of species and the naming of genera. Incidentally it may be remarked that the detailed naming of genera gives great advantage in the discussion of development, faunal distribution, chronological sequence, and other phenomena. By one word it is possible to lay the finger on the particular restricted lineage required, and thus to express its characters—cumbersome periphrasis is avoided, and greater precision of expression is attained with needful brevity.

CHRONOLOGY

See T.A. III, 5, Editorial; for Chronology of Lower Oolites see Y.T.A. II, x, and 'Brach. Namyau'; Pal. Ind. N.S. III (2), 1917, 236-239; for Middle Oolites see 'Kell. R.'; Q.J.G.S. LXIX, 1913, p. 160. These tables are not yet satisfactory: all will require emendation and possible expansion—exact chronological work is only just beginning.

A further upward extension is presented in the following Table ; but it must be regarded as only provisional.

TABLE I, ARGOVIAN CHRONOLOGY

OLD TERMS	FAUNAL HORIZONS	STRATA
	11. ?	The White Course.
	10. ?	The Coral Beds.
<i>Martelli</i>	{ 9. <i>Dichotomoceras</i> 8. <i>martelli</i> group	The <i>Exogyra</i> Beds. The Shell Bed.
<i>Biarmatum</i> (Morley Davies 1916)	7. <i>Aspidoceras</i>	Base of Shell Bed.
<i>Vertebrale</i> (or <i>cordatum</i>)	{ 6. <i>Vertebriceras</i> , see p. 16 5. <i>Goliathiceras</i>	{ Lower Calc. Grit.
	4. <i>Korythoceras</i> and <i>Peltoceras</i> , see p. 17	Loch Staffin Beds.
	3. <i>Peltoceras</i> , <i>P. arduennense</i>	H. 15, Oolite ferrugineuse of Villers-sur-Mer, Normandy (R.D.). Oxford Clay, Hunts; Cowley, Oxford. Borings, Kent (Dr. Kitchin).
Upper pre- <i>cordatum</i> (Morley Davies 1916) pre- <i>cordatum</i> (S.B. 1911) <i>scarburgense</i> (S.B. 1913)	2. <i>scarburgense</i>	Oxf. Clay, Studley, Oxon and Brill, Bucks (A.M.D.). Borings, Kent (F.L.K.) ; H. 6, Villers-sur- Mer, (partly), (R. Douvillé) ; Jura Bernois (Loriol).
Lower pre- <i>cordatum</i> (Morley Davies 1916) pre- <i>cordatum</i> , S.B. 1911	1. <i>Cardioceras</i> <i>cardia</i> = <i>A.</i> <i>cordatum</i> , Sow., Paratype, see p. 15	Oxf. Clay. Studley Brickyard ; (Lydlinch, Sturminster Newton, Dorset) ; Wotton Station and Quainton Road, Bucks (Morley Davies) ; Borings, Kent (F.L.K.) ; Jura Bernois (Loriol).

"Corallian," near Oxford.

The placing of *Vertebriceras* above *Goliathiceras* is an assumption based on the more calcareous matrix of the former, the sands passing upwards into limestones.

The term *pre-cordatum* was employed by me as a provisional time-term. Subsequently R. Douvillé gave the trivial name *præ-cordatum* to a *scarburgense*-like species of about the same date.

TERMINOLOGY

See III, p. 5. It is necessary to return to this subject : such a method of work will have to be employed in other cases.

Palingenesis : Dr. W. D. Lang has published two interesting papers dealing with this and other phenomena (The Evolution of Ammonites ; Proc. Geol. Assoc. XXX, 1919, p. 49 ; Old Age and Extinction in Fossils ; Id. p. 102). In the former he suggests the term Lipogenesis instead of that of saltative palingenesis (Y.T.A., I, 1910, p. xiii) and says that "it is a modification of tachygenesis" (p. 60). It may be suggested that it is not so much a modification, but, rather, a specialized acceleration of tachygenesis, and that Lipogenesis (literally, genesis in which something is wanting, or skipped) scarcely expresses the phenomenon. The term seems more suitable for the phenomenon of mutations used in the sense of De Vries ; and the present phenomenon is not merely genesis, but palingenesis, or recapitulation, in which something is wanting. Therefore it would seem that the term required is **Lipopalingenesis**. Its acceptance would involve congruous terms for the other phenomena of palingenesis—cunctative and precedentive.—**Bradypalingenesis** and **Propalingenesis** may be suggested.

Type-designation : A term of wider significance than topotype is required. A quarry only a short distance away, but in another parish, and even in another county, may show a stratum lithically the same as the original locality, with typical examples of named species. Yet these specimens would not be correctly termed topotypes, though they may be as valuable as topotypes for identification purposes. Therefore **Chorotype** is proposed (*χώρας*, a district).

The application of chorotype may in some cases be fairly wide when the stratum remains lithically constant over a considerable area, or it may be inapplicable in a short distance owing to lithic change. It should be used independently of political boundaries.

Association-term : Syntopite (*σύν* with, *τοπίτης*, belonging to a place" : S. Buckman, Brach. Namyau Beds ; Pal. Ind. N.S. III (2) 1917, p. 234) "a stable-companion"—occurring in the same locality and same stratum. This should be a useful term. Thus *Am. plicatilis* and *Am. vertebralis* are syntopites in the Lower Calcareous Grit of Dry Sandford/Marcham, Berkshire (see p. 16) and Cowley, Oxfordshire. *Am. plicatilis* is, therefore, not a species of the Upper Corallian, as Miss Healey supposed (Q.J.G.S., LX, 1904, 56 ; Pal. U. 1904, 57), misled by an error long current in English geological literature.

It may be noted that *Am. plicatilis* seems to fail on the Continent just as does *Am. vertebralis* and its allies (see p. 16), whereas the *goliathus* group (*Goliathiceras*), also characteristic of the Lower Calcareous Grit of England, is wide-spread in France (d'Orbigny).

Measurement : The table designed by Mr. Tutchter (Y.T.A., App. Tab. I), is very useful, but I have now found that a slide-rule purchasable at an ironmonger's is suitable for the purpose : it allows of greater

accuracy, care being taken in reading the lower numbers, and it can be used for any size of specimen. When dimensions have been given instead of proportions, as is the case in many works, they can be translated by simple reading of the rule.

When photographs are measured instead of specimens the results may be slightly at variance—chiefly from the camera giving a widening of the umbilicus at the expense of the whorl. Measurements from photographs may, therefore, advisedly be marked ϕ

SYSTEMATIC

As an introduction to this subject it is necessary to make some remarks with a view to providing certain short cuts in descriptive matter.

Abbreviations: Photograph, ϕ , see above; other abbreviations, see following paragraphs.

Tuberculation: For distinguishing Ammonite genera particular attention requires to be paid to the position of the tubercle on the side of the whorl. Thus a distinction between *Trilobiticeras* and *Otoites* is that in the former the tubercle is in the line of the lateral auricle—actually in certain cases, a rare phenomenon, (*T. trilobitoides* Pl. CXL) it is found on the auricle itself; but in *Otoites* the tubercle is in the line of the inside of the auricle. Then in the so-called zigzag series (or one section of it, *Procerites*) what is analagous to, and possibly a development of the tubercle, the parabolic curve, is found in the line of the outside of the auricle (Pl. CLIII). It becomes necessary to express these phenomena with brevity. Reading from left to right, the specimen is placed with its periphery to the left, and therefore in *Procerites* the tubercle (or its analogue) is \bigcirc Lap.—before the lappet; but in *Trilobiticeras* it is (Lap.), this does not mean that it is on the lappet itself, but that it is in the line of the lappet. However, when the lappet is broad enough further particularization may be necessary. The tubercle may be in the line of the outside, of the middle, or the inside portion, which can with brevity be expressed as (Lap. 1, 2 or 3) respectively. *Trilobiticeras* is (Lap. 2), *Epalxites* is (Lap. 3).

Useful, however, as observation of position with regard to the lappet may be, yet that is not a constant feature. The suture-line therefore can be taken as a guide, alone or in addition. The varying position of the tubercle with regard to the suture-line has long been recognized as a generic character, though it has been insufficiently employed: its different locations on the lateral area—a less satisfactory guide—have more usually been considered. Now Dr. A. E. Trueman, in an excellent study (Evol. Lip.; Q.J.G.S. LXXIV, 1919, p. 247) has graphically illustrated (p. 258) the different positions of tubercle to lobes of suture-line in a detailed series of genera.

For reading the suture-line the specimen is placed in the same position, venter to left, inner part to right, that is, EL, L^1 , L^2 and so on. Position with regard, say, to L^1 may be $\bigcirc L^1$, that is, before L^1 is reached, (L^1)—that is in the line of the area of L^1 ,—and $L^1 \bigcirc$, that is after L^1 . When lobes are wide-stemmed further precision may be attained as with the lappet—(L^1 1, 2 or 3). The saddles can be used in the same way.

Thus some tuberculation formulas are

○ <i>Procerites</i>	L ¹ ○
○ <i>Trilobiticeras</i>	(L ²)
○ <i>Otoites</i>	L ² ○

and see Trueman :—

○○ <i>Liparoceras</i>	(L ¹ 2) S ¹ ○ L ² , that is, on L ² partition.
○○ <i>Becheiceras</i>	(L ¹ 3), (L ² 1).
○○ <i>Androgynoceras</i>	○ L ¹ , ○ L ²
○○ <i>Amblyoceras</i>	○ L ¹ , (S ¹)

When lobes develop laterally, expanding in some cases even to invading their neighbours' territory, attention would not be paid to these expansions for formula purposes—the main stems of the lobes would give the position.

Furcation : When the tubercle has not developed, or has declined, so that the rib shows no swelling, the place where the tubercle will arise, or where it may have been, is marked sometimes by rib-furcation. The position of this may be important, and can be noted by the same formulæ, using, however, instead of ○, the sign V. The signs OV indicate that the tubercle is the furcation point, enclosed where necessary within the brackets to show that the position is in the line of the area of lobe or saddle.

Family LIPAROCERATIDÆ

See II, v, B; also Dr. A. E. Trueman, "The Evolution of the Liparoceratidæ"; Abs. Proc. Geol. Soc. No. 1022, 1918, p. 65, Q.J.G.S., LXXIV, 1919, p. 247.

The following new genera are proposed—Trueman, 1918, p. 66 :—

PARINODICERAS, "Genoholotype, *Am. striatus parinodus* Quenstedt ([Amm. Schwäb Jura], 1884, pl. xxviii, fig. 6)";

BECHEICERAS. "Genoholotype, *Ammonites* [*Ægoceras*] *bechei* Wright (Lias Amm., pl. XLI, fig. 1)";

ANISOLOBOCERAS. "Genoholotype, *Ammonites nautiliformis*, J. Buckman, [Y.T.A., I, 37, Pls. XXXVII A, B.]" and see II, xv.

Trueman 1919, p. 264 :—

VICININODICERAS. "Genoholotype, *V. simplicicosta*, sp. nov. [p. 289]. Pl. xxiv, fig. 4."

And in the same publication (p. 262) he discusses

AMBLYOCERAS Hyatt, 1900, "Genoholotype: *A. capricornus* Hyatt in Eastman-Zittel, 'Text-book of Palaeontology,' 1st ed. vol. i (1900) fig. 1204, p. 578."

Family AMMONITIDÆ (ARIETIDÆ)

See Y.T.A., II, B and *Oxynoticeras*, Y.T.A., I, ii.

Oxygastric, *Amblygastric* : Pompeckj used these terms to denote differences in the degree of sharpness acquired by narrow peripheries of 'Oxynotes' (*Oxynotic*.; 'Comm.' Serv. Géol. Port. VI, 1906, 7, p. 291); more or less of a knife-edge—oxygastric; a blunt edge or narrowly rounded venter—amblygastric. For use with oxycones and platycones. Their employment with oxycone is no more tautological in the one case

nor contradictory in the other than the phrases sharp axe and blunt axe, when "axe" really means a "sharp implement." The terms will be useful for other families.

RADSTOCKICERAS S. Buckman 1918, (Jur. Chron. Q.J.G.S., LXXIII, 287), "Type *R. complicatum*, [xxvii, 1]". Oxygastric oxycone with highly complicated S.L.

GLEVICERAS, S. Buckman 1918, (Op. cit. 289). Type, *G. glevense* (paratype) [xxviii, 2]. Amblygastric oxycone, with somewhat complicated S.L. and regular ribbing.

GUIBALICERAS. S. Buckman 1918, (Op. cit. 293). "Type, *Am. guibalianus* D'Orbigny, Pal. franç. Terr. Jur. Céph, pl. LXXIII." Sub-oxygastric oxycone, with somewhat simple S.L.—EL much longer than L^1 —, and intermittent ribbing.

VICTORICERAS. S. Buckman 1918 (Op. cit. 293). "Type, *Ammonites victoris* Dumortier, Bassin Rhône ii, pl. [xlii], figs. 1 and 2"; pl. xlv" is a misprint. Amblygastric oxycone, with somewhat simple S.L.—EL and L^1 about equal—, dichotomous ribbing and test radially striate with punctæ in the striæ. T.A. CXXXVI.

TUTCHERICERAS S. Buckman 1919; Genotype *T. perfoliatum*, T.A., Legend of Pl. CXXXVIIA. Amblygastric oxycone with highly-complicated S.L. somewhat feeble ribbing and test radially capillate, not punctate.

FASTIGICERAS S. Buckman 1919; Genotype *F. clausum*, T.A., Legend of Pl. CXLIV. Amblygastric oxycone, fastigate in whorl-section and almost clausumbilicate. S.L. quite simple, ribbing obsolete.

These six genera with *Oxynoticeras* take the following natural order according to position marks (see op. cit. p. 296), *Tutchericeras* having the following marks—ES, 6, L^1 , 7, Periphery, 1, Ribbing, 2, Umbilicus, 4; and *Fastigiceras* having 1, 3, 4, 1, 7 for the same:—

<i>Radstockiceras</i>	30
<i>Victoriceras</i>	22
<i>Oxynoticeras</i>	22
<i>Tutchericeras</i>	20
<i>Fastigiceras</i>	16
<i>Guibaliceras</i>	16
<i>Gleviceras</i>	14

Family CADOCERATIDÆ

See Y.T.A., II, xiii and B.

EBORACICERAS, see Y.T.A., II, xiv. The holotype of *Am. ordinarius*, Bean-Leckenby, has been kindly sent by Mr. H. Woods, F.R.S., from the Sedgwick Museum, Cambridge. The species belongs to this genus, a stage earlier than *E. dissimile* (Y.T.A., II, 118); cf. *Am. lamberti pinguis*, Quenstedt, 1887, xc, 15.

Scotland, England, France, Germany; Divesian.

Lamberticeras, g. n. Genoholotype, *L. lamberti*, J. Sowerby sp.—a topotype so identified, in Mr. Tutcher's Coll. (Pl. CLIV).

Oxygastric platycone; costate, non-tuberculate, V on S^2 ; periphery 2, crenulate by V-ribs. Versiradii with prorsiradiate curve to mid-periphery; primaries occasionally bifurcate, usually separated by 3 unconnected secondaries. S.L. simple, with short, broad lobes; L^1 just beyond guide-line, L^2 just touching. Swollen stage slight, only around umbilicus. England, (Foreign?); Divesian.

The topotype is from a band of argillaceous limestone in Oxford Clay, and is not pyritized; it is iron-stained: judging by the colouring of Sowerby's plate his large example is from the same source. Associated with this specimen—that is from Weymouth—are a large number of similar-looking specimens, all of which are out of clay, are dark black, and are pyritized. They are, presumably, not strictly contemporaries of the example from the band—coming, perhaps, from just above or just below the argillaceous band, or both. They all differ in suture-line—having rather long and narrow lobes: this character may also be noted in the various *lamberti*-like forms figured by R. Douvillé from Normandy (Cardioc. 1912). The rarity of *Am. lamberti* in contrast to the abundance of *lamberti*-like forms is, perhaps, to be explained by the difference in matrix—that extraction from the limestone band was difficult and subsequent cleaning tedious, whereas the pyritized specimens would be lying out on the surface washed nearly clean. Such attractive specimens would be readily collected, while what looked like the same in bad condition would be neglected. It would be interesting to know if such collection-failure accounts for the absence of *Am. lamberti* from Normandy or whether it is due to stratal failure.

Proportions of *Am. lamberti*, J. Sowerby, 1819, (M.C. III, 73, CCXLII, 3)—T. and F. 63, 43, 24? 29; of Mr. Tutchter's specimen, S. 69, 43, 5, 27.5, 28.5.

CARDIOCERAS, Neumayr & Uhlig 1881, (Amm. Hilsbild.; Palaeont. xxvii, (3) III, p. 140). A. Amaltheen mit normaler Lobenzahl .. 2) Loben verzweigt, Antisiphonallobus einspitzig (Cordati) .. *Cardioceras* nov. gen." No type selected, but "*Cardioceras cordatum* Sow." given in list of species (p. 141), and this is evidently indicated by the name. Such has been general usage (R. Douvillé, 1912, 26); the other species originally mentioned have long been allocated to other genera. But more precision is required; for the name *Ammonites* (or *Cardioceras*) *cordatus* has been applied to a whole series of widely-differing forms from several different strata. Therefore *Card. cordatum* covers various genosyntypes, and a lectotype must be chosen. As Sowerby's holotype of *Am. cordatus* is a small shell, difficult to identify with accuracy—for a little difference in so small a shell can become a big difference in more fully-grown examples—and as its suture-line is not known, it seems desirable to pass it over in favour of Sowerby's paratype, now well-known from Miss Healey's researches (Pal. U. 1905, 94). The forms to which the name *Am. cordatus* have been given generally agree more nearly with this than with the holotype.

Therefore CARDIOCERAS Neum. & Uhl. 1881, genolectotype *Am. cordatus* Sowerby, paratype (Min. Conch, 1813, I, p. 51, xvii, 4) = *Cardioceras cardia*, nom. n., Coll. Brit. Mus. (Nat. Hist.) No. 43980 b. Proportions: T. & F. (Miss Healey), T. 55, F. 43.5. T. 36, T. 29. Tuberculation: (ES), for keel is knotted; (S1). Suture-line (Miss Healey, Pal. U., fig. P.4), EL and L¹ rather long and about equal, L² short, well separated from guide-line. Keel distinct, bordered by depressed areas, and crossed by V-shaped ribs. "Upper Oxford Clay" [Argovian, c. *scarburgense* (Argovian 1)]; it is about one of the earliest of the carinate Cadoceratids. Loc. "Somersetshire," Sowerby; "Axminster, Devon," Crick, Types Ceph., Brit. Mus. (N.H.), 1898, 13. I have a recollection of examining this specimen many years ago with the late G. C. Crick, who pointed out some writing on it. This showed "... minster" clearly; the first part, which was very indistinct, Mr. Crick made out as "Ax" and concluded Axminster, Devon, an impossibility. I now suggest that it is "Sturminster" for Sturminster Newton, Dorset. Specimens in the

collection of the Geological Survey from Lydlinch, which is 3 miles W. of Sturminster Newton, show about the zone required, c. *scarburgense*, though examples of Sowerby's form are not among them. Lydlinch is actually about $3\frac{1}{2}$ miles from the Somerset border, and less than 2 miles from the detached portion of Somerset around Holwell. So Lydlinch may fit in well enough with Sowerby's location of Somerset: a small mistake as to the run of county boundaries is easily made.

England, (Foreign ?); Argovian 1.

Vertebriceras g. n. The *vertebrale* group. Genoholotype, *V. dorsale* n. described below. Strongly carinate serpenticones becoming massive, [almost sphaeroconic, then declining to platycones], periphery 4 with knotted keel, ornament 5**. Tuberculation, (EL), OL¹ (S¹+V). S.L., rather long and narrow L¹, about equal to EL, L² short and broad.

A series nearest to *Cardioceras* as now defined, but with a strong keel on a broad, almost tabulate, subsulcate periphery. Ribs about radial, but with strong sweep backward from contact-line over inner margin, less strong sweep forwards on periphery [increasing in terminal species]. Body-chamber about $\frac{3}{4}$ whorl. Depressed area alongside keel and on line of L¹.

This is the most ornate series of the Cadoceratidæ: it does not attain to anything like the swollen stage of some, but it is the most massive of the distinctly carinate genera—attaining inflation of about 60 per cent. Early whorls of *V. dorsale* are polygyral smooth, indicating a slowly-coiled serpenticone ancestor. (*Vertumniceras* and *Goliathiceras* give evidence of similar stage). If a keelless platycone stage followed this in the phylogeny, it is omitted; and the serpenticonic stage is soon obscured in massive species by the tachygenesis of swollen stage.

England (Dorset, Berkshire, Oxfordshire). Argovian 6.

The species of this genus seem to be lacking from Continental strata—identifications of *Am. vertebralis* being incorrect. *Card. dieneri*, Neumann (Oxf. Cetechowitz; Beitr. Pal. Oest-Ung. XX, 1907, v, 16, 17) has lateral aspect of *Am. quadratus*, but its fastigate periphery excludes it from this genus. Its ribbing prevents association with *Cardioceras* as now defined; but it seems to range with *Am. cordatus*; d'Orbigny (Céph. Jur. cxciv, 2, 3).

In Argovian 1, associated with *Cardioceras*, are small specimens with somewhat stout whorls of *Vertebriceras* pattern: they are not forerunners—they lack the polygyral stage, and differ in other respects. The species of *Vertebriceras* are large shells.

V. dorsale n. Like *Am. vertebralis*, but whorls much less massive, ribbing not so heavy, umbilicus wider. Tuberculation and S.L. as above. S. 80, 35, 42.5 (38), 39. Cowley, near Oxford; Lower Calc. Grit, arenaceous limestone; Argovian 6; S.B. Coll. 2780, Holotype and Genotype.

V. vertebrale, J. Sowerby sp. 1817, (Min. Conch, II, 147, CLXV; Miss Healey, Pal. U. 1905, 93). Proportions (Healey, fig. Ha), F. 56, 45, 59, 25; 82, 39, 55, 31; fig. H., F. 111, 35, T. 41, F. 37.5; Univ. Mus. Oxford Coll. From a quarry of Lower Calc. Grit on south side of main road from Abingdon to Faringdon, $2\frac{3}{4}$ miles from the former; between the villages of Marcham, $1\frac{1}{4}$ m. to S, and Dry Sandford, 1 m. to N.

Chorotype, S.B. Coll. No. 3234, L. Calc. Grit; Cowley, near Oxford; S 80, 36, 54, 30; 98, 36, 47(43), 32.

V. rhachis n. Like *V. vertebrale*, but decreasing thickness and expanding umbilicus earlier—decline from *V. vertebrale*; ribs not so coarse; S. 80, 35, 46, 36; max. c. 90. Cowley, near Oxford, Lower Calc. Grit, S.B. Coll. No. 2776 Holotype, 2777 Paratype.

TYPE AMMONITES

BY

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The illustrations from photographs mainly by

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Part XXII

Pp. 17—18; 16 Plates

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V. quadratum, J. Sowerby, 1813, (M.C. I, 52, xvii, 3); T. & F. 37, 39, 30? 30; An example from Cowley, near Oxford, L. Calc. Grit, S.B. Coll. No. 2779; S. 96, 36, 27, 32.5. The somewhat polygyral inner whorls of this example match what is shown in Sowerby's figure. They persist longer than one would have expected—cunctative palingenesis?

The above species would have much the same maximum diameters—av. c. 100 mm., about same whorl-breadth—c. 36 per cent. The differences are thickness, umbilication and size of ribbing. There should be a species between *V. dorsale* and *V. vertebrale*.

LAMBERTICERAS, p. 14, Pl. CLIV, and PRINOCERAS, Pl. CLV: Mr. L. F. Spath, F.G.S., kindly advises that they are pre-occupied. It is necessary to change.

Bourkelamberticeras instead of *Lamberticeras*—the species was named after Aylmer Bourke Lambert (J. Sow. III, 73).

Prionodoceras instead of *Prionoceras*.

Prionodoceras, g. n. (πριον, a saw). The *serratum* group. Genoholotype, *P. prionodes* n., Pl. CLV.

Amblygastric, convergent-sided platycone; periphery 3—fastigate, strongly carinate, carina serrate. Tuberculation—(EL) [more pronounced after loss of ribs], [(ES), L¹ in costate species]. Very long projection of rad. l. on periphery. S.L. simple with short, broad lobes [longer in costate spp.], loculi short, septa crowded (degenerate?).

Distinguished by swollen stage developed on inner margin, whence whorls slope to narrow periphery; a substantial serrate keel; excessive rostration and simple suture-lines packed close (degenerate?). Swelling scarcely commences till ribs are much in decline. *Am. serratus*, J. Sow., *Am. serratus*, Damon (non Sow.) and many other species. Cf. *Cardioceras shuravskii*, Sokolov (Petschora; Mém. Comm. Géol. 76, 1912, II, 4-6,) England; Russia? In the Midlands and eastern counties of England the species occur in Drift and have been placed in Museums as from Oxford Clay. They occur in Kimmeridge Clay (Damon), lower part—the Upper Oxfordian of Salfeld—for the present to be reckoned as Kimmeridgian, though a distinctive term is perhaps wanted.

Korythoceras, g. n. (κόρυς, helmet). Genoholotype, *K. korys* nov., described below.

Galeatiform; periphery 3; ornament 4; costæ laterally slightly flexed, versiradiate, regularly bifurcate, S¹V L², slightly bullate, well-projected on keel; S.L., ES and L¹ about equal, L² short, lobes broad, saddles narrow.

A series with characters of *Vertumniceras* and *Goliathiceras*. Separable from the first by finer regular ribbing and a distinct keel; from the second by ribbing, by the more pronounced keel on which ribs form a fairly projected V, by radial line all behind guide-line, by suture-line with short L². It would not attain stoutness of that genus. Scotland; and Swiss Jura?

K. korys, n. (cf. *Cardioceras goliathus*; Lorient (non d'Orb.), Oxf. inf.; Mém. Soc. Pal. Suisse, XXVII, 1900, 30, III, 7). Galeatiform, with fine, regularly bifurcate ribbing, sweeping well forward over a distinct keel; involute; S. 42.5, 47, 52, 24; "Loch Staffin, Isle of Skye, Scotland, Oxford Clay" with *Peltoceras*—*P. cf. interscisum* Uhlig (Lorient) etc.: [Argovian, post-scarbursense pre-vertebrale Argovian 4]. Mus. Geol. Surv. Engl. Coll. No. 30380 Holotype and Genotype; No. 30381 Paratype.

Goliathiceras, S. Buckman 1919, T.A., Legend of Pls. CXXXII A—C. The *goliathus* group. Genoholotype *Goliathiceras ammonoides*, Young & Bird sp., Plesiotype, Pl. CXXXIIc.

Galeatiform, becoming sphæroconic; periphery 2; ornament 4, obscurely bullate on S^1 ; versiradii, towards periphery rursiradii with little peripheral projection. S.L., lobes long, rather narrow, L^2 about to guide-line.

A massive galeatiform series in which the most inflated species, *G. goliathus*, attains to a swollen stage of about 100 per cent. Has usually been assigned to *Cardioceras*, but whorl-shape, inflation, radial line and suture-line are all distinctive. Radial line has little projection on periphery, it crosses a feeble keel by a broad V; most of its lateral portion lies beyond guide-line. Many species rising to *G. goliathus* and then declining. [Lobes not so long in declining species—septal degeneration?] England, France; Argovian 5.

Pavloviceras, g. n. Genoholotype *P. pavlovi*, R. Douvillé sp., a specimen in Mr. Tutchter's Coll. which agrees with *Quenstedticeras pavlovi*, R. Douv., Cardioc. Mém. Soc. G. Fr., XLV, 1912, 74, 75, XI (v), 13. Sphæroconic; periphery 1; ornament 4, coarse and bullate, **OV** L^2 , ribs rounded—funiculate—rursiradiate, very slight V on middle of venter. S.L., lobes rather long and somewhat narrow, L^1 not as long as E L, L^2 about same distance from guide-line as L^1 .

Like *Goliathiceras* in inflation and suture-line, but differing in the more massive ornament and in the fact that the attempt towards a keel fails very early—it would only be found in brephomorphs and anamorphs—so that a flatly arched venter is produced.

Normandy; England (Dorset, Oxfordshire, Huntingdonshire); Swiss Jura; Russia. Divesian, *vertumnus*, according to Douvillé's Normandy evidence; but it is not yet known from Yorkshire.

P. omphaloides, J. Sowerby sp. 1819 (M.C. III, 74, CCXLII, 5. Whorls tumid, galeatiform, a little more than half-included. Ribs about radial, sometimes a little rursiradiate—the primary and forward secondary run nearly straight round whorl—the hinder secondary is rursiradiate. The V on periphery is feeble. There is an attempt at an angulate periphery and towards a knotted keel in youth, but this fails at about 25 mm. diameter.

The above description is drawn up from a topotype. At the next rib after 34 mm. diameter this shows a sudden jump in the size of the whorl—see proportions below. This explains a feature of Sowerby's plate—there the sudden jump is shown at the second primary (fifth secondary) rib from the end, before the pyritized lump—the same place as in the topotype. In the next species, *P. bathyomphalum*, the jump is shown about the same place—perhaps a rib earlier. Weymouth, Dorset; Oxford Clay, pyritized; Mus. Geol. Surv. England, No. 30569; S. 26, 42, 57, 31; 34.5, 41, 57, 29; 36, 47, 60, 29. Another example, Oxfordshire; same Coll. No. 30574, 26 mm. diam.

P. bathyomphalum, nov. Cf. *Quenstedticeras sutherlandiæ*; Loriol, Pal. Suisse, XXVII, 1900, III, 10. Stoutier than *P. omphaloides*, with a smaller umbilicus, which, on account of stout whorls, is quite deep. Periphery arched. Jump in size of whorl at about 34 mm. diam. St. Ives, Hunts; Mr. Tutchter's Coll., S. 26, 44, 67, 27; 34, 46, 70, 26; 50, 45, 65? 24; full size of specimen 59 mm.; max. c. 90 mm. A brephomorph, Great Northern Railway [Walton, Hunts], Mus. Geol. Surv. Engl. No. 30571, S. 20, 45, 60? 31—certainly thicker and less umbilicate than *P. omphaloides* at the same diameter.

P. stibarum, nov. Cf. *Cardioceras goliathus*; Loriol, Pal., Suisse, XXV, 1898, II, 14. Stoutier than *P. bathyomphalum*, with more flatly-arched periphery, but less stout than *P. pavlovi*, and with less flattened periphery. Ornament not so coarse as *P. pavlovi*, more in agreement

18-

TYPE AMMONITES

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs mainly by

J. W. TUTCHER

Part XXIII

Pp. 19—24; 13 Plates and a Portrait

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And a Portrait of James Buckman

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ST. GEORGE'S HALL

with *P. bathyomphalum*. St. Ives, Hunts; Mr. Tutchers's Coll., Holotype, S. 34, 48, 70, 23.5; 59, 43, 75, 25; size 63 mm.; max. c. 90 mm.

P. pavlowi, R. Douvillé sp. *Quenstedticeras pavlowi*, R. Douv., op. cit. 1912, XI, 13, Holotype, F. 57, 39, 81, 26; 70, 44, 81, 26, not taken at end, as this seems damaged. Paratype, Russian example, R. Douv., Id. p. 74, figs. 80-82, F. 53, 38, 79, 27; 98, 45, 90, 25.5. Mr. Tutchers's specimen, Genoholotype, from St. Ives, Hunts, Oxford Clay, S. 35, 40? 74, 23?; 55, 43, 82, 25; Pl. CLXX.

P. roberti nom. nov. Holotype, *Quenstedticeras sutherlandiæ*; Robert Douvillé, 1912 (non Murchison sp.), op. cit. XI (v), 8 only. An involute development of *P. pavlowi* with the thickness beginning to decrease from that of the Russian example of that species, and the periphery becoming rounder, foreshadowed in the same form. F. 54, 41, 82, 16.5; 104, 46, 82, 21.5, Normandy.

The proportions of the last two species, especially the agreement in thickness, are fair evidence for their relationship. The next species after *P. roberti* might be more involute in youth, would be excentrum-bilicate in adult—the starting indicated in the proportions of *P. roberti* given above—thinner, and perhaps attaining smoothness. It may have been confused with *Am. goliathus* or *Am. sutherlandiæ* in collections.

Sagitticeras g. n. Genoholotype, *S. sagitta* nov. Serpenticonic becoming tumid; periphery 2 to 1 c; ornament 4, coarse, ribs laminar; crest-like bullæ, **OVL**²; similar bullæ less strong, EL. Like *Vertebriceras*—the genotype especially has resemblance to *V. rhachis* (III, p. 16); but a keel is not developed—instead strong ribs of *Vertebriceras* pattern cross the periphery with V curves or arrow-like, the apices rising to little transverse crests; and against these apices, leaning backwards, are little buttresses, whose bases point forwards, but die away before touching next V. The presence of these buttresses, with their consequent slight raising of the median line of periphery, gives a suggestion of keel bordered by feeble depressions of the *Vertebriceras* pattern, but only when the specimen is held at certain angles to the light. Ribbing strong, of *Vertebriceras* pattern, the ribs run sufficiently forward on periphery to throw radial line all behind guide line. Ribs rise nearly radial from contact-line, not with the strong backward sweep of *Vertebriceras*. In general characters of development the genus is between *Vertumniceras* and *Vertebriceras*. England (Dorset, Huntingdonshire) Argovian, pre-*Goliathiceras*, perhaps intermediate 4 and 5.

S. fastigatum, nov. Whorls somewhat flat-sided, with distinct inner margin and a fastigate periphery. The periphery is like that of *Vertumniceras damoni* (Y.T.A. CXVIB), but ribs do not make so sharp a V. Ribs are less projected forwards than in *S. sagitta*—otherwise ornament is similar, but not so developed. Umbilicus is gradate. St. Ives, Huntingdonshire [Oxford Clay, grey argillaceous matrix]; Mr. Tutchers's Coll.; S. 51, 44, 49 (43), 33.

The question now arises whether *Am. vertumnus*, Damon, 1880, I, 3 = *Quenst. damoni*, Nikitin, (see Y.T.A. 116 c), is the same species as the Yorkshire example (Y.T.A. CXVIB). It looks as if the Dorset species had the laminar ribs with slight forward projection of this genus: if so, it would be the species before *S. fastigatum*. The Yorkshire species is rightly a *Vertumniceras*, but would then have to take another trivial name.

2. *S. sagitta*, nov. Whorls tumid, rising with a somewhat gibbous curve from inner edge till they meet a flatly-arched broad periphery—at the meeting place are strong somewhat crest-like bullæ,

the furcation point **VL**². Ribs are strong, sharp, compressed, (laminar), rising very slightly ruricostate from inner edge, continuing thus to **V**, then bending forwards, fairly regularly bifurcate, on a sweeping curve to middle of periphery: guide-line from this cuts through next forward primary. Umbilicus somewhat cadiconic without definite inner margin. End of whorl shows complete mouth-border—quite plain, curving to a long, forwardly projected, somewhat incurving rostrum which is carinate (cf. *Cardioceras cordatum*; Lorient, Pal. Suisse, XXIX, II, 7). Carina presumably formed on last four or five ribs (but periphery damaged): same distance of terminal part shows decay of ribbing and contraction of cone. Body-chamber $\frac{3}{4}$ of whorl.

Weymouth, Dorset, "Oxford Clay"—a bluish calcareous matrix—[junction of "Oxford Clay" with Lower Calcareous Grit, pre-vertebrale, Argovian, about intermediate 4, 5]; Mus. Geol. Surv. England, 30371; S. 51, 43, 63 (57), 31.5; 68, 43, 53 (45), 30; max. c. 79 mm., Holotype and Genotype.

*Weissermelicer*as, g. n. Genoholotype, *W. longilobatum*, n. (Pl. CLXXXIII). Swelling serpenticonic; periphery 2 to 1 c; ornament 4, rather small, regular, mostly bifurcate, occasionally intercalate, **VL**², little difference in size between primary and secondary ribs, the former versiradiate, the latter prorsiradiate, making a wide V on periphery. Suture-line with particularly long and slender lobes, **L**¹ well below guide-line, **L**² just below, aux. 3 touching.

Like *Eboracicer*as, but distinguished by the finer, more regular ribbing and the long slender lobes.

England (Yorkshire); East Prussia?

W. longilobatum, n. (Pl. CLXXXIII). Cf. *Quenstedticeras sutherlandi*ae; Weissermel, non Murchison sp. (Zeitschr. Deutsch. geol. Ges. XLVII, 1895, XI, 3 only). The genotype is a specimen sent from Sedgwick Museum, Cambridge, with name *Quenstedticeras ordinarium*, but it is well distinguished from that species. It agrees with Weissermel's figure, except that he shows more curvature of primary ribs and somewhat more spaced ribbing towards end of whorl. From iron-stained sandstone of so-called Kelloway Rock, Scarborough; Callovian, *athleta*; S. 53, 43.5, 45, 26.5; size of specimen 63 mm.; max. c. 84; 28 ribs on whorl to 53 mm. diam.

*Eichwaldicer*as, g. n. Genoholotype, *Ammonites carinatus*, Eichwald, (Lethæa rossica II, 1868, xxxiv, 8). Serpenticone, rapidly developing cadicone; periphery, 1; ornament, 4; costæ rursiradiate, bifurcate from swellings on edge of inner margin.

The serpenticonic stage belongs to brephomorphs [and anamorphs], which also show an attempt towards carination: this only achieves a sequence of V-costae, and is soon lost—swollen stage rapidly develops with a broadly-rounded periphery. A very inflated cadicone is developed, much like *Cadoceras*; but the genus is distinguished by the more distinct attempt towards carination in early stages, by developing a cadicone out of a serpenticonic without passing through a platycone stage.

The species figured by Weissermel (*Cadoceras carinatum*; *Quenstedic*.; Zeit. Deutsch. Geol. Ges., XLVII, 1895, XII, 1) and by R. Douvillé, (*Quenst. carinatum*; Cardioc. ; 1912, x (IV), 57, 58, non cat.) are presumably the cadiconic developments of Eichwald's species, that is later developments, biologically, of *Eichwaldicer*as, and require new names.

Sufficient genera of Cadoceratidæ have now been described to illustrate the method of work, but not sufficient to deal properly with

the very varied morphology of this remarkable family. But a provisional analysis of the genera now named may be interesting. Three developmental features are striking—(1) the attainment of inflation: in this some genera are very successful—*Cadoceras*, *Goliathiceras*, *Eichwaldiceras*, and seem to end in it; others are fairly successful, *Eboraceras*, *Vertumniceras*, *Vertebriceras*—the last passes beyond it back into platycone; others make little progress, and may be said to fail, *Pseudocadoceras*, *Longæviceras*, *Bourkelamberticeras*; the last drops off into oxycone; (2) the attainment of carination: in this *Vertebriceras* is most successful, especially in combining it with fair success in regard to inflation; *Cardioceras* is also successful in regard to carination, less so as regards inflation; *Sagitticeras* is remarkable for an attempt at carination which comes so near success and yet fails; some genera show an attempt abandoned as soon as inflation comes—*Eboraceras*, *Pavloviceras*, *Eichwaldiceras*; others are successful because inflation takes place only around umbilicus—*Chamonssetia*, *Korythoceras* and, in a feeble degree so far as carination is concerned, *Goliathiceras*; others seem to make no attempt—*Cadoceras*, *Pseudocadoceras*, *Prorsiceras*; (3) the attainment of tuberculate ornament: the Argovian and later genera show this—*Cardioceras* and *Vertebriceras*, which have also knotted keels; *Amæboceras* and *Prionodoceras*, which have serrate keels. The early genera do not attain the tuberculate stage; some of the later genera, for instance *Prionodoceras*, not only attain it, but lose it—pass beyond it to the catagenetic stage of smoothness.

In early genera development takes place from a platycone stage—*Cadoceras*; in later genera development starts from an earlier stage—the serpenticonic—*Vertumniceras*, *Vertebriceras*, *Goliathiceras*,—the platycone stage being skipped; and it is to be presumed that, in the earlier genera, the serpenticonic stage has been skipped or forced into insignificance by tachygenesis of platycone.

In later genera a secondary platycone (even oxycone) stage is developed after more or less of swollen stage, which also may persist into it, though with declining intensity—*Prionodoceras*.

A fuller, tabular, analysis of these and other genera of the Cadoceratid family may be attempted later.

Family STEPHEOCERATIDÆ, Buckman, 1898

Suture-line with tubercle, **OV**, outside of L^2 , later, on to L^2 and, in some very serpenticonic forms, inside it; L^2 feeble, generally surpassed by a highly-developed aux. 1. Suspensive lobe may become highly elaborated and long. The cadicone stage passes into serpenticones, and there are no sphærocones.

Genera, *Stepheoceras*, Buckman, 1898, *Normannites*, Munier-Chalmas 1892, *Stemmatoceras*, *Teloceras*, *Skirroceras*, *Epalxites*, Mascke 1907, *Masckeites*, Buckman, 1920. Some other already-named genera may come here, but that has not been proved.

The family Pachyceratidæ (Y.T.A. II, *xiii*) is presumably a development of the early members—cadicones—of this one—whorl-shape of *Erymnoceras* and tubercle-position are the same. Ground for separation may perhaps be found in the simpler suture-line.

Family SPHÆROCERATIDÆ, nov.

Suture-line with **OV** on, later inside, of a broad-stemmed, spreading L^2 , which is more or less unequal-sided, the suspensive lobe feebly developed, and no highly-elaborated auxiliary lobe.

Genera *Sphæroceras*, Bayle, 1878, *Emileia*, Buckman 1898, *Otoites*, *Chondroceras*, Mascke 1907, *Docidoceras*, *Labyrinthoceras*, *Trilobiticeras*, *Morrisiceras*, Buckman 1919, 1920, and *Macrocephalites*, to be removed from Pachyceratidæ.

It seems inadvisable to employ the family name Otoitidæ, Mascke, as the present grouping is so very different. Several of these genera are distinctly sphæroconic, *Emileia* passes through it and becomes platyconic; but *Docidoceras* is an exception: it develops serpenticones without passing through a sphærocone stage.

It will be noticed that genera with lateral auricles come into Stepheoceratidæ and Sphæroceratidæ. Such forms are regarded as phaulomorphs. Suture-line is considered to be a better test of affinity than mouth-border.

Family MORPHOCERATIDÆ, Hyatt, 1900.

This requires much emendation. All the genera given by Hyatt (Eastman-Zittel, Pal. 1900, p. 583) must be excluded, except *Morphoceras*. There may be added *Oecoptychius*, Neumayr, and new genera, *Æcoptychoceras* and *Ebrayiceras* (see below).

The family is in origin presumably akin to the Sphæroceratidæ, and it develops sphærocones out of which come, normally, serpenticones—the transition from sphærocone to serpenticone is so rapid in some cases as to give the curious 'dimorphous' feature—and, abnormally, goniocones—the same transition in an exaggerated form.

The difference from Sphæroceratidæ is the suture-line—comparatively simple, with L^2 compact, not spreading; retraction feeble, sometimes lost—phylogerontic development.

MORPHOCERAS, H. Douvillé, 1881 (" *Am. pseudo-anceps* "; Bull. Soc. Géol. Fr. (3) VIII, 242). "Type: *A. polymorphus* Cloisons présentant une série de lobes régulièrement décroissants."

There are 4 specimens figured in d'Orbigny (Pl. CXXIV) belonging to two, if not more, species. These are syntypes. The s.l. (fig. 7) shows the characters cited above, and from d'Orbigny's text (p. 381) is presumably taken from fig. 4. Therefore this specimen is chosen as genolectotype.

Add—ribs, furcation twice—inside L^2 and sometimes again outside it. Periphery with smooth median line, into which fade ribs that alternate; constrictions well-marked cutting across 4 or 5 ribs. Mouth not known to be auriculate. S.l.—lobes rather broad-stemmed, E.S. narrow, E.L. and L^1 approximate, L^2 nearly as long as L^1 , all lobes touching guide-line.

EBRAYICERAS, g.n. Genoholotype *E. ocellatum*, n. Pl. CLXXIII. Furcation single—on or inside L^2 ; primaries short, swollen; periphery sulcate, ribs thereon not quite opposite, ending as feeble nodi abruptly at interruption; constrictions feeble, nearly parallel with ribs. Mouth

auriculate; S.L.—lobes narrow; E.S. wide; L^2 about half-length of L^1 .

Vesulian (Eningenian) *zigzag* hemera, France (N. & S.), England (Dorset, Somerset).

E. ocellatum, nov. Pl. CLXXIII. Thinner and more umbilicate than *E. pseudo-anceps*, Ebray sp.: it is also less excentrumbilicate—the umbilicus in youth being wider. The example figured shows the mouth considerably closed up, but with ocular and brachial apertures open: the same as is depicted by H. Douvillé for *Morphoceras pseudo-anceps*.

This example also shows (Fig. 2a) a great abbreviation of the last air-chamber—marked in black between the two last septa.

E. pseudo-anceps, Ebray, sp., (1864, Etudes géol. Dep. la Nièvre, p. 263; H. Douvillé, "Am. *pseudo-anceps*" ; Bull. Soc. Géol. Fr. (3) VIII, (1880), 239; fig. 2, p. 240.) The example now figured (Pl. CLXXIV) is smaller than Ebray's type as depicted by Douvillé, but agrees in proportions with his figure at the same diameter. Douvillé's text, however, differs from the proportions of the figure. His diameter (p. 241) is T. 38, F. 36.5. The diameter is presumably over the shell with mouth, and then it agrees with figure. His breadth of whorl is T. 12 mm., F. 14.5, thickness T 10.5, F. 11. umbilicus T. 13 mm., corresponding to his "maximum radius of umbilicus" 8 mm., F. 12.5. These figures translated to a diam. 36.5 do not agree with the figure, and the breadth of 12 mm. seems too small, because breadth + umbilicus = 69 per cent. when they should be nearer 72 per cent. The breadth of whorl at end of fig. is, however, presumably exaggerated. For proportions, see below (p. 24).

In the specimen now depicted ocular and brachial apertures are closed up—the animal has moved forwards; it will be noticed that the length of body-chamber to end of mouth is the same as to beginning in *E. ocellatum*. The closing up seems, from growth-lines, to have been done by the mantle working backwards, closing the hinder parts of the apertures last. There is reason to think that tubercles and parabolic excrescences have, in certain cases, been formed in the same way—not by the forward edge of the mantle, but by portions further back, extruding as if repairing an accidental break. The hinder part of closed brachial aperture is in shape just like a preceding primary rib.

At the end of the lateral part of mouth of Fig. 2a is a laterally-protruding excrescence which may be some attached foreign body: it is not on the other side (Fig. 1a).

E. vaschaldi, Reynès sp. in Collot, Descr. géol. . . d'Aix, 1880, 27 (Douvillé, 240). Professor Repelin, Director of Marseilles Museum, has kindly sent me casts of Reynès types, for which I express my best thanks. The holotype shows a species much larger than the others: it has much finer (hair-like) ribs, more closely set. Esparron, Bouches du Rhône.

E. jactatum, nov. Fine-ribbed like *E. vaschaldi*, but with ribs conspicuously thrown forward instead of radial. Involute and concentrically coiled in early stage, excentrumbilicate last half-whorl. Constrictions more marked than in other species. Burton Bradstock, Dorset [*zigzag*], S.B. Coll. No. 3316, Holotype.

E. rursum, nov. A widely-umbilicate form, concentrically coiled, because the wide umbilicus begins early. Ribs coarser than in *E. ocellatum*, and generally in threes, mostly reclined, making an angle with the lateral nodes. Mouth present, imperfect, a large ocular

aperture. Burton Bradstock, Dorset [zigzag], S.B., ex Darell, Coll., No. 3365, Holotype.

Ebrayiceras—Proportions—order of umbilication.

<i>E. pseudo-anceps</i> (Dorset) ..	S. 24,	42,	—,	32
	S. 29	38,	33,	34.5.
<i>E. pseudo-anceps</i> (Type) ..	F. 24,	42	—,	33
	F. 29,	38	—,	35.5
	F. 36.5,	40, [36 ?]	30	34 [36 ?]
	T. 36.5,	33, [36 ?]	29	36
<i>E. vaschaldi</i>	S. 46,	32.5,	24,	39
<i>E. jactatum</i>	S. 35,	37,	31.5	31.5
	S. 47	32,	23.5	40.5
<i>E. ocellatum</i>	S. 24,	35.5,	31.5,	35.5
	S. 29,	33,	28.5	40
<i>E. rursum</i>	S. 28,	28.5,	26,	43

By the time *E. ocellatum* had reached a diameter of 36.5 mm., the size of type *E. pseudo-anceps*, it would have something like 42 per cent. umbilication.

OECOPTYCHIUS, Neumayr, 1878, Cephalopodentypen, Jahrb. k. k. geol. Reichsanstalt, XXVIII (1), 68, Genotypes "Gruppe des *Ammonites refractus*." Advisable to take as genoelectotype *Am. refractus*, d'Orbigny, Terr. jur. Céph. CLXXII, 4, 5. [S.l. lobes short and simple, EL longer than L¹, trilobulate, L² single, quite short, about one-fourth the length of L¹—from a Bavarian example].

Callovian; France, Germany.

The difficulty of placing this genus in *Morphoceratidæ* is the absence of connecting links—Eningenian to Callovian. But the *Sphæroceratidæ* show no forms with peripheral sulcus, the *Morphoceratidæ* do.

OECOPTYCHOCERAS, g.n., Genoholotype, *Æc. subrefractum*, n. Pl. CLXXVI. A catamorph development of a sphærocone which has acquired a gonioconic outline. From *Oecoptychius* it differs [in mouth-border (see Brasil, Céph. nouv. ; Bull. Soc. géol. Norm. XVI, 1893, p. 21, Pl. IV, f. 12, 13)], and also in the ribs crossing the periphery with very slight weakening, making an almost indiscernible median line, not a distinct ventral interruption of ribs or sort of sulcus as in *Oecoptychius*. At beginning of body-chamber only there is a short hidden sulcus on periphery—in cast not in test: the same is often to be seen in *Sphæroceratidæ* and *Morphoceratidæ*.

EL and L¹ about same length, L² incipiently trilobulate, about $\frac{1}{2}$ of L¹. [Lobes more developed in *Æc. grossouvrei*, Pl. CLXXV.]

This genus cannot be ancestor of *Oecoptychius*, as it is already more decadent in costation. The two genera are morphic equivalents produced by similar causes from more or less distinct sources, as the difference in periphery shows. *Oecoptychoceras* is perhaps connected with *Morphoceras*, *Oecoptychius* with *Ebrayiceras*, at least according to peripheries.

England (Dorset) ; Normandy ; Germany ? cf. Neumayr, cit. p. 68, Vesulian (Eningenian), *truelliei*.

Oecoptychoceras grossouvrei (Brasil), Loc. cit. *Oecoptychius grossouvrei*. The example figured, Pl. CLXXV, is the sphærocone stage before the goniocone stage begins—most of body-chamber being lost.

Burton Bradstock, Dorset, *truelliei*—the matrix is unmistakable. S. 8.5, 57, 76, —, which agree with Brasil's illustration at same diam.

Oecoptychoceras subrefractum, S.B. MS. sp., *Oecoptychius grossouvrei*, S.B., Q.J.G.S., LIV, 1898, 456 (non Brasil). This (Pl. CLXXVI) is

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Part XXIV

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194. <i>Ammonites gulielmi</i> (<i>Gulielmiceras gulielmi</i>)	CXCIV

a thinner and smaller form than Brasil's species. His dimensions are, from beginning of depression before mouth through umbilicus, T. & F. 15.5 (31), 58, 48, —, and this one is much the same at a diameter of 10.75, taken at the same place—consequently, at this diameter Brasil's species is much thicker (see preceding species).

The prorsiradiate primary ribs bifurcate into decreasingly rursiradiate secondaries. Just before the angle the primaries nearly disappear and the secondaries pass rather suddenly into fine ribs.

Broad Windsor, Dorset—the suggested date, *truelliei* hemera, would accord with that of the Burton-Bradstock species."

Family OPPELIDÆ, S. Buckman 1898.

OPPELIA, Waagen, 1869, (Form. *Am. subradiatus*; Geogn.-Pal. Beitr. II. (2), 250). Genosyntypes, *O. subradiata* s.l.; Genolectotype, *O. subradiata*, Waagen, Id. Pl. xvi, f. 1, (non *Am. subradiatus*, J. de C. Sowerby) = *O. waageni* nom. nov. This form shows major ribs at intervals and short minor ribs in the interspaces: these die away, leaving major ribs only, perhaps relics of the bullate ribs of *Diplesioceras*, see below.

OEOTRAUSTES, Waagen, 1869, Id. p. 251 (*Oekotraustes*). Genoholotype, *Oecotraustes genicularis*, Waagen, Id. Pl. xx, f. 4a, b. Ribs are uniform in this genus.

DIPLESIOCERAS, g.n. (διπλήσιος, twice as much). Genoholotype, *D. diplesium* n. Pl. CLXXVII. Serpenticone; carinate-bisulcate; costate, with, at intervals, a double-sized rib ending in a bulla on latero-peripheral border. This genus is remarkably like *Dipoloceras*, Hyatt, of the Lower Cretaceous, but the strong rib does not fork, instead it remains single, and swells into a strong bulla or blunt transverse knob.

This genus presumably belongs to the family Oppelidæ, and shows in its intermittently strong costation a phase through which *Oppelia* and like forms have presumably passed; for there remain in such forms short ribs at intervals which would correspond to the bullæ and be relics of their former existence—the intermediate ribs and other part of the strong ribs having disappeared in catagenesis from serpenticone to oxycone, retained latest around the keel. If this supposition be correct, then *Oppelia*-like forms have had a much more varied history than has been supposed—they have rapidly dropped the serpenticone, carinate-bisulcate, tuberculate stage, and have become examples of quick transformation with skipping of stages, pronounced lipopalingenesis.

England (Dorset). Vesulian (Eningenian), *garantiana*.

D. diplesium nov. Pl. CLXXVII, sufficiently described in generic diagnosis. Vetney Cross, near Bridport, Dorset; S. 15, 40, 53 (40), 28; S.B. Coll. No. 3265, Genotype and Holotype.

Family PERISPINCTIDÆ, Hyatt, 1900.

This was proposed for the very large series of costate serpenticones which characterize the Middle and Upper Jurassic strata; but they are of polyphyletic origin. The family diagnosis must be deferred until the genotype of the typical genus *Perispinctes* has been selected; for

the application of the family name depends on that and it has not yet been done.

PERISPINCTES, Waagen, 1869 (Form. *Am. subradiatus*; Geogn.-Pal. Beitr. II. (2), 248). Proposed for the Planulites of the Middle and Upper Jura—all named by that date are thus genosyntypes; but the author limits choice by the description—that in the young the mouth-border has auricles and the whorls have constrictions. Siemiradzki (Mon. *Perisph.*; Pal. XLV, 1899, 78) applies generic name s. str. to certain series more or less connected with *Am. martelli*. As he has selected no one genotype, and still calls all the species of his six Abtheilungen by the name *Perisphinctes*, choice is still unfettered and should fall, if possible, on a species fulfilling Waagen's description, named before 1869, and, as the suture-line is very important, on an auriculate showing that feature—a difficult condition, as sometimes suture-line and side-view have, without notice of the fact, been taken from different examples, which may be only homœomorphs.

The difficulty of such choice is well shown by the following account. It seemed that *Ammonites martiusii*, d'Orbigny, would be a suitable subject for type: it was doubtless one that Waagen had in mind, for both constrictions and auricles are striking. However, I put certain questions to my friend Professor Welsch. I summarize his interesting information—the result of his study of the types.

The name is *Ammonites martiusii*, not *A. martinsii*, as given in places by d'Orbigny and by so many authors: it was dedicated to M. de Martius, the botanist. The figures given by d'Orbigny are greatly restored, idealized from various examples which are not necessarily the same species; [they are, in fact, synthetographs]. There is no evidence for the auricle of the mouth of fig. 1, Pl. cxxv of d'Orbigny, in the example which furnished the main of the figure: the auricle is taken from another specimen, perhaps another species. The mouth of fig. 2 is restored as regards the saddles and lobes. The mouth of fig. 3 is imagination. The suture-line is taken from another specimen rather smaller than 210 mm. The proportions are taken from an example of 210 mm.

With such a mix up as this identification is almost impossible, and it would be unsafe to take *Am. martiusii* as a genotype. It is advisable, however, to fix on figs. 1, 2, of d'Orbigny's plate without their mouths as the holotype of the species. It is presumably about of *niortensis-garantiana* date.

Another auriculate species, *Am. defranciai*, d'Orbigny, Pl. cxxix, 7, is not now a *Perisphinctes*: it belongs to the Morphoceratidæ. Another auriculate, *Am. bakariae*, d'Orbigny, Pl. cxlix, 1, has been taken as type of the genus *Siemiradzki*, Hyatt; it therefore falls out. Another candidate might be *Am. achiles*, d'Orb., Pl. ccvi, 1, 2; but this is excluded from the species by Dr. Siemiradzki, who gives an opinion on its identity. As this lacks s.l. and may be a synthetograph like *Am. martiusii* and as it is impossible to go on with the necessary investigations for each likely species, it seems advisable to return to Siemiradzki's position: this is helped by the fact that a small specimen of, or near to, Siemiradzki's *Perisphinctes* s. str. has been found at Cowley, near Oxford, S.B. Coll. No. 3264, showing a lateral auricle. Whether, however, this is a brephomorph or a phaulomorph is not yet certain.

For genolectotype of *Perisphinctes* is now selected *Am. biplex*, Sowerby; it is, which is important, a species figured before Waagen founded the genus. Its suture-line is partly visible: Dr. W. D. Lang

has kindly forwarded a sketch. The suspensive portion comes much further down the whorl than that of *Dichotomoceras* and the lobes are more highly developed: like those of *P. martelli*, Siemir., p. 268, fig. 61.

This selection makes Siemiradzki's "Formenreihe des *Per. biplex*" (p. 256) the typical and perhaps only series of *Perisphinctes*.

The result may be thus stated:—

Family PERISPHINCTIDÆ, Hyatt (see above, p. 26). Descendants of coronates which in the catagenetic costate stage show parabolic curves (intermittent zigzag ornament) and deep constrictions. Umbilicus angulate, with fine ribs and constrictions [earlier, coronate cadicone, skipped in later forms?]. S.l. may become fairly complex. Parabolic curves fail soon and constrictions may be ultimately lost.

Genera, *Perisphinctes*, *Dichotomoceras*, *Grossouvria*.

Siemiradzki notices the angulate character given by constrictions to the inner whorls of his *Perisphinctes* s. str. (p. 78) and compares it with *Morphoceras* sculpture (p. 79); cf. *Dichotomoceras*, CXXXIXc, 1; but admits that the same character comes in small forms of the "subtilis-Reihe" (p. 235), which, seemingly, has a coronate-cadicone origin—the cadicone obvious but the coronate lost perhaps by brady-palingenesis.

A *Morphoceras* origin is doubtful for many reasons—chiefly the difference in position of furcation. Somewhat of the *Morphoceras* style required is shown by *Vermisphinctes* (Pl. CLXII), but the lack of parabolic curves prevents that coming into this family.

The following corrections in nomenclature of species of *Perisphinctes* s.l. have usually been overlooked, and it seems advisable to note them here:—

Ammonites triplicatus, J. Sowerby, 1815, M.C. I, p. 208, xcii, 2, [Kimmeridgian, post-*virgula*?], "Portland Island, [Dorset]."

Ammonites trifidus, J. Sowerby, 1821, M.C. III, p. 194, name given to *Am. triplicatus*, J. Sowerby, 1821, M.C. III, 167, ccxcii and ccxciii, 4 (non *Am. triplicatus*, Sow., 1815). Holotype, ccxcii, "Pisolate formation [Argovian, c. *martelli*]....near Malton, Yorkshire."

Am. triplex, J. de C. Sowerby, 1835, M.C. VI, p. 249, name given to the two specimens of *Am. triplicatus*, J. Sow. 1821; but, as the holotype is already named *trifidus*, only the paratype is available. This is from "Marly Limestone....probably Calciferous Grit,....at Shotover, near Oxford." A topotype, S.B.Coll. 2778, large adult, from Cowley, (foot of Shotover Hill), near Oxford; Lower Calcareous Grit—Argovian, c. *Goliathiceras*; S. 287, 21, 23.5 (22.5), 61.5.

PERISPHINCTES, Waagen 1869, loc. cit. Genosyntypes, Planulates of Middle and Upper Jura. Genolectotype, *Ammonites biplex*, J. Sowerby 1821, M.C. III, 168, ccxciii, 1; refigured, Miss M. Healey, 1904, Q.J.G.S. LX, 57; x; Pal. U. 58. S.l. ornate, with long suspensive part whose component lobes are fairly developed. Tubercle (or furcation point) on edge of periphery, [just inside L¹]; peripheral ribs not strong, dichotomous in young [presumably tritomous in adult, before a stage of massive ribbing is attained]. Proportions of *Am. biplex* (Dr. Lang): S. 46.5, 32, 33, 41; 120, 29.5, 29, 44; 160, 29.5, 24, 48.5. These dimensions differ from those given by Dr. Siemiradzki (p. 267) chiefly in the less thickness of the inner whorls, where there is displacement and filling in by calcite: this would not be shown in a plaster cast.

DICHOTOMOCERAS, S. Buckman 1919, T.A., III, Legend of Pl. CXXXIXA. Genotype, *D. dichotomum*. Like *Perisphinctes* as now

defined, but distinguished by the lower stage of development of the s.l., by stronger ribs on the periphery and perhaps by remaining dichotomous and not passing to tritomous ribbing. Subsequently it develops similar massive ribs in old age—*D. ingens* Young & Bird sp. Pl. CLXXXIV; *D. variocostatum*, Buckland sp. (Healey, Q.J.G.S. LX, 1904, 58 f. 2; XI; Pal. U. 56).

GROSSOUVRIA, Siemiradzki, Oct. 1898, Mon. *Perisph.*; Palæontographica, XLV, pp. 78, 79. "I. Abtheilung. Subgen. *Grossouvria* nob. A. Mutationsreihe des *Per. subtilis*" (p. 79).

This makes *Per. subtilis* the indicated genoholotype, which may be fixed with further precision on the holotype of the species, Neumayr, Balin, XIV, 3.

Before proceeding further it is advisable to note the different methods by which costate serpenticones (Perisphinctean forms) have been produced in the Inferior Oolite; for it is here that change over is seen to advantage—the inner whorls, sometimes till quite late in life, so different from the outer, which are Perisphinctean.

A. Inner whorls.	B. Outer whorl or whorls.
1. Bullate cadicone, <i>Docidoceras</i> .	Costate serpenticone, <i>Docidoceras</i> .
2. Tuberculate serpenticone (Skirroceratan).	Costate serp.
3. Tuberculate serp. with sulcate venter (Parkinsonian).	Costate serp., <i>Caumontisphinctes</i> .
4. Tuberculate serp., zigzag ornament.	Costate serp., <i>Procerites</i> .
5. Sphæroconic with constrictions (Morphoceratan).	Costate serp. No parabolic curves, <i>Am. defranciai</i> .

Differences of inner whorls, when there are several whorls before a change takes place, are good evidence for difference of origin, but differences of embryonic whorls only are not good necessarily—omission due to lipopalingenesis and modifications due to brady- and propalingenesis have to be allowed for.

The Perisphinctidæ, as now defined, showing parabolic curves, considered to be intermittent zigzag ornament, have presumably come from a later development of 4A, having taken a road different from 4B—preserving relics of zigzag ornament and not losing all that ornament suddenly.

Of the above, 1 belongs to the Sphæroceratidæ, 2 to the Stepheoceratidæ, 5 to the Morphoceratidæ. Thus 3 and 4 are left.

Family PARKINSONIDÆ, nov.

Descendants of coronates which acquire more or less of peripheral sulcation and at this stage have a comparatively simple s.l. They pass on the one hand into uncoiled forms and on the other hand into costate serpenticones: these develop constrictions, lose the peripheral sulcation more or less completely and may elaborate the s.l. A stage with parabolic curves is not developed.

In the early Perisphinctean forms (costate serpenticones) the coronate stage with lateral tubercles and the sulcate stage with some-

times peripheral tubercles bordering the sulcus are well shown in inner whorls.

Genera, *Parkinsonia*, (*Choffatia*?) *Strenoceras*, *Garantiana*, *Baculatoceras*, *Subparkinsonia*, *Bigotites*, *Pseudobigotella*, *Caumontisphinctes*, (*Leptosphinctes*, *Vermisphinctes*?).

The evidence of Parkinsonian origin—sulcate periphery—is contained in the inner whorls of *Caumontisphinctes* and other genera to be named: these whorls also preserve the lateral tubercles of the coronate stage. There is as yet no evidence that *Choffatia*, *Leptosphinctes* and *Vermisphinctes* passed through a Parkinsonian stage, though the two latter show evidence of having been coronates: they may have to be removed. *Am. martiusii* is possibly akin to *Leptosphinctes*.

CHOFFATIA, Siemiradzki, 1898, Op. cit. p. 79. "VI. Abtheilung. Subgenus Choffatia nob. Embryonalkammern glatt, comprimirt, ohne jede Spur von Seitennöhren. Mundrand wie bei *Per. Martinsi* abgestutzt, ohrenlos. Seitensculptur ähnlich der *Martinsi*-Gruppe. Lobenlinie einfach.

"Diese Gruppe verbindet die Perisphincten mit der Gattung *Proplanulites* und enthält eine einzige Formenreihe: Reihe der *Per. cobra* Waag." (p. 79).

This marks the genoholotype and there is only one reference to that (p. 334)—"1875, *Perisph. cobra* Waagen, Kutch, S. 174, Taf. 45, Fig. 1." And this is unique; from the zone of *Reineckia anceps*, Kutch, India (Siemir. p. 335).

BIGOTELLA, Nicolesco 1917 (Bull. Soc. Géol. France (4) XVI, 153), invalid through prior use.

BIGOTITES, Nicolesco 1918 (C. R. somm. Soc. Géol. Fr., Jan., p. 36). To replace *Bigotella*. No genotype indicated in either case, and queries as to his choice addressed to the author gave no result. Therefore *Bigotella thevenini*, Nicolesco 1917, op. cit., Pl. IV, fig. 9 with s.l. fig. 3, p. 178, is now taken as genolectotype of *Bigotites*. Stout; ribs somewhat strong, mostly bifurcate; occasional constrictions; ribs alternate on periphery, fading into a narrow smooth band which conceals a slight furrow of cast. S.l. has EL much longer than L1, a deep ES which gives obliquity even to L1; aux 2 about as large as L2, lying across whorl nearly parallel with, but above guide-line; aux. 3 cut by guide-line.

Several of the species placed by M. Nicolesco in *Bigotella* (*Bigotites*) appear to represent, not a genus in the phylogenetic sense, but a developmental stage—members of different lineages have independently arrived at the periphery with obsolescent interruption, which may be called the Bigotitean stage of venter. If so, this should be revealed by differences of suture-line. The Bigotitean venter is transitional between the Parkinsonian with distinct peripheral interruption and the Perisphinctean with ribs uninterrupted. All the Parkinsonidæ which attain the Perisphinctean venter pass through more or less of a Bigotitean stage. But in other families which do not develop the episode of a Parkinsonian venter, the Perisphinctean venter is a continuation of the Stepheoceratan venter: peripheral interruption may appear later.

PSEUDOBIGOTELLA, P. Lemoine, 1918 (Rev. crit. Paléozool. XXVII, (1, 2), p. 34). To replace *Bigotella*. "M. Nicolesco n'a pas indiqué de genotype; la première espèce décrite est *Pseudobigotella Haugi*. . . . Je verrais dans tous les échantillons, . . . décrits par M. Nicolesco, une seule espèce . . . qui porterait le nom de *Parkinsonia Haugi*." The author thus makes *Bigotella haugi* (Nicolesco) the genotype of his

Pseudobigotella, but condemns *Pseudobigotella*, as, in his opinion, an unnecessary addition to nomenclature.

Polygyral; thin; rather small ribs which cross periphery with a V-curve; s.l. quite simple—EL longer than L₁—very little obliquity to inner part. Cf. Pl. CXCI.

Pseudobigotella has the Perisphinctean venter, presumably having passed through the stages of Parkinsonian and Bigotitean venters; but this is not yet proved: it may be inferred from evidence of other genera.

HASELBUBGITES, gen. nov. Like *Bigotella petri*, Nicolesco, IV, 5. Distinct from *Bigotites* in suture-line—ES is shorter instead of longer than L₁, and it lacks a lateral branch; guide-line cuts above aux. 2, and there are 4 aux. in a long hanging part which extends well below guide-line. Genoholotype, *H. admirandus* nov. Like *B. petri*, but more massive, ornament heavier, umbilicus smaller, lateral ribs obsolesce about 170 mm. diam. From Haselbury, Somerset (purchased); Inf. Oolite [*Parkinsoni* z.]; S. B. Coll. 654; S. 129, 33, 36, 42; 218, 36, 29, 37; max. c. 410 +. Its date is presumably c. *truellei*; but *Strigoceras truellei* appears to be lacking from Haselbury. A Morphoceratid of *defrancii* pattern occurs in the same bed—a light yellow stone, finely oolitic, soft. ('Top bed' [1] or 'Brash' [2], Hudleston, Mon. Gast., Pal. Soc., 1887, p. 31).

Family ZIGZAGICERATIDÆ, nov.

Descendants of those coronates which have zigzag ornament—later coronates than the ancestors of the Parkinsonidæ. These lose their parabolic curves as soon as they enter the costate stage, and they show no stage of intermittent parabolic curves like the Perisphinctidæ. Also constrictions are not developed.

The s.l. in the zigzag stage is comparatively simple, of Stepheoceratid style; in the costate stage, or even earlier in the stout forms, it rapidly develops to become very elaborate, distinguished by large EL, with large accessory branch, and by large aux. 2 spreading across the whorl. These characters, though there may be decay of s.l., should yet remain relatively distinguishing.

Genera, *Procerites*, *Zigzagiceras*.

PROCERITES, Siemiradzki 1898 (Op. cit. p. 78.) "V. Abtheilung. Subgen. Procerites nob. C. Mutationsreihe des *P. procerus* Seeb." (pp. 78, 79). The earliest whorls show lateral ornament like that of *Stephanoceras zigzag*—on a smooth under-surface zigzag-like coarse distant ribs which on the dorsal [ventral] margin swell up into spine-like little knobs (Siemir. p. 78).

From the character of its inner whorls *Procerites* is undoubtedly a descendant of the Stephanocerata in a narrow sense (Siemir., p. 79). The development from "*Stephanoceras*" zigzag had been illustrated by S. Buckman, Q.J.G.S., XLVIII, 1892, 447, and the likeness of inner whorls of zigzag forms to coronates (*Am. blagdeni*—*Teloceras*) was also pointed out.

Unfortunately, the identification of *Am. procerus* seems to be incorrect, now that s.l. of zigzag costates has been worked out. M. A. de Grossouvre also points this out (Bull. Soc. géol. Fr. (4) XVIII, (1919), 387). *Am. procerus*, Siemiradzki's interpretation, is genototype of *Procerites* (Y.T.A. II, 1914, ix).

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TYPE AMMONITES

BY

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The illustrations from photographs mainly by

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Part XXV

Pp. 31, 32; 15 Plates and a Portrait

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And a Portrait

Jan.

To *Am. procerus*, Schloenbach (Jur. Amm. Palæont. XIII, 1865, xxx, 1), he gives special attention, and this may now be definitely taken as genolectotype. It has been named (as a syntype) *Am. schloenbachi* by Grossouvre, 1907 (Six. Congres Assoc. Franc-Comtoise, p. 8) and *Procerites schloenbachi* by Grossouvre, 1918, (Bull. Soc. G. Fr. (4) XVIII, p. 388). So this lectotype of *Procerites schloenbachi*, Grossouvre sp., is genotype of *Procerites*, which covers compressed forms of *zigzag* origin in which *zigzag* ornament is soon lost.

ZIGZAGICERAS, S. Buckman 1902 (Y.T.A. II, 1914, ix). This covers massive forms of *zigzag* origin in which *zigzag* stage persists for some time.

The rapid development of an elaborate s.l. in *Zigzagiceratidæ*—in small forms with *zigzag* ornament the s.l. is comparatively simple (S. Buckman, Q.J.G.S., XLVIII, 1892, xiv, 1)—is paralleled by the rapid elaboration of s.l. in other genera, *Vermisphinctes*, *Leptosphinctes*. Elaboration of s.l. may not necessarily be a reason for parting genera from those which have it poorly developed—such forms may have merely retained the original form of s.l., or they may be phaulomorphs. Again, septal degeneration has to be allowed for—a phenomenon particularly noticeable in certain *Perisphinctoids*, *Propalaulites*, *Pictionia*. Comparison should be between what may be called the acmic forms of s.l. of different lineages.

Family ATAXIOCERATIDÆ, nov.

Distinct from *Perisphinctidæ* as defined above (p. 27) by (1) difference of inner whorls—instead of angulation and morphoceratan sculpture, delay in production of ornament (*bradypalingenesis* ?); (2) longer retention of parabolic curve stage and parabolæ perhaps placed more peripherally; (3) secondary ribs on anamorphs and brephomorphs often *rursicostate*, passing in later forms to *versi-* and then to *prorsicostate*; (4) s.l. comparatively simple (*einfach*; *wenig verzweigt*; *Siemir.*).

Genera, *Biplices*, *Ataxioceras*, *Siemiradzkia*, *Planites*, etc.; *Poculisphinctes*.

BIPLICES, v. Sutner-Siemiradzki 1898, (*Siemir.* p. 77). “a. Mutationsreihe d. *Per. Tiziani* und *Colubrinus*.” Now chosen as genolectotype, *P. tiziani* (Oppel), *Siemiradzki*’s interpretation, (pp. 147-149).

ATAXIOCERAS, Fontannes 1879, (Crussol, p. 66, x, 1-4); “*Perisphinctes* (*Ataxioceras*) *hypselocyclus*.”

“Le terme *Ataxioceras* a été imprimé pour la première fois dans l’explication de la planche x (fig. 1-4) de la Description des Ammonites des Calcaires du château de Crussol (Ardèche) par Fontannes ou il est intercalé entre parenthèse entre *Perisphinctes* et *hypselocyclus*. Cette espèce est donc le type du genre *Ataxioceras* Fontannes, 1879” (R. Douvillé, Bull. Soc. Géol. France (4) X, 1910, p. 734, footnote 2).

SIEMIRADZKIA, Hyatt 1900 (Eastman-Zittel, Pal. I, p. 582). “Type S. (*Am.*) *Bakerie* d’Orb. sp. (Terr. Jurass. Pl. 149, Fig. 1, non Pl. 148).” Parabolæ strongly developed. The sealing of ocular apertures (*Morphoceras pseudo-anceps*, CLXXIV) suggests a method of making parabolæ.

PLANITES, de Haan, see Y.T.A., II, 1913, p. iv.

TERMINOLOGY

See III, 5, II. Technical terms for well-grown and ill-grown forms are required—that which accords with the normal standard may be

known as a **Kallimorph**—nomomorph, p. 6, refers only to size, not to standard condition in shape and ornament; that which is not normal, **kakomorph**. This requires subdivision: a form awry in shape, **plagiomorph** (πλάγιος, crooked); a form with ornament awry, distorted ribs, loss of keel in a carinate or like defects, or with exaggerations, any disturbance of ornament due to injury or disease: **dysmorph** (Pl. CLXXXVIII). Dysmorphism in youth may be recovered from, to show a kallimorph old age, or a kallimorph youth may receive injury and become a kakomorph adult. As Gastropods and Turrilites show, plagiomorphism may become the standardized form: then it is really kallimorphism and further chance departure from that standard would be required to constitute plagiomorphism. The Turrilites of the Cretaceous are not truly plagiomorphs, but the so-called Turrilites of the Lias are.

For a study of malformed or cripple Ammonites see Engel, Ueber kranker Ammonitenformen im schwäbischen Jura; Nova Acta Ksl. Leop.-Carol. Deutsch. Akad. Naturf. LXI, (5), 1894, 327.

A further term is required for a shell which has undergone deformation during fossilization: **allomorph** (ἄλλος, other than what it is, untrue). *Gracilisphinctes gracilis*, Pl. CXIII, is an allomorph, its shape altered by compression.

SYSTEMATIC

Family PROPLANULITIDÆ, nov.

Heavy ribs in and around the umbilicus suggest a *zigzag* origin; but style is different—stoutest part near inner, instead of towards outer end; and its persistence, through serpentine and into platycone; also **V** is nearer inside—about on L₂ instead of nearly on L₁; while the s.l. is far less developed. Species with these characters may be surmised to have a coronate (Teloceratan) origin and to fall between the families Zigzagiceratidæ and Pachyceratidæ—s.l. much less developed than that of the first, rather more developed originally than that of the second, but quickly falling into a very degenerate condition: in the well-developed stage there is a spreading (palmate) ending to L₁ which is very characteristic. In Pachyceratidæ the teloceratan (cadicone) stage is long retained, and there is little falling away from it; in Proplanulitidæ there is rapid falling off into compressed serpentine cones, even platycones, with narrowed periphery, little sign of cadicone and only heavy ribs as relics of teloceratan stage: even these suffer—in some Proplanulites there is much delay in their appearance, presumably the phenomenon of bradypalingenesis. The length of L₁ in proportion to breadth of whorl appears, at any rate in this family, as a useful guide to genera and to series within genera. This may be stated thus: L₁ at 47 mm., 42 per cent. When, in illustrations, s.l. has been traced, the length of guide-line is greater than breadth of whorl by the amount of the gibbosity of the whorl—a reduction will have to be made before stating the result: the greater the gibbosity the greater the reduction. In s.l. reproduced from a photograph no correction should be required. The measurement of L₁ is made from the end of the terminal lobule up the middle to a line joining ES and Sr. Where one saddle is deeper—more produced—than the other, the cross line may run obliquely. Up to a certain point the length of L₁ should increase; afterwards, as the whorl loses gibbosity and increases its breadth proportionately to diameter, the length of L₁ would decrease. In aged specimens the

TYPE AMMONITES

BY

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Part XXVI

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last few septa before body-ch. may show much degeneration, and should, where possible, be avoided.

Genera, *Proplanulites*, Teisseyre, *Wagnericeras*, nov., see below, *Crassiplanulites*, nov., see p. 41; *Obtusicosites*, nov., see p. 42; *Kinkelinceras*, nov., see p. 42; *Pictonia*, Bayle, *Rasenia*, *Ringsteadia*, Salfeld.

Of these genera *Obtusicosites* is nearest to the main stem and so to the Pachyceratidæ, while *Proplanulites* is farthest removed, being the most degenerate in all characters.

Am. albineus, Oppel, *Per. mutans*, Waagen and the series placed by Siemiradzki as "Mutationsreihe des *Per. Congener* Waag." possibly come into this family.

WAGNERICERAS, g.n. Genotype, *Am. wagneri*, Oppel (*Am. planula*, d'Orb., CXLIV). Serpenticone, convergent whorls; ribs flexed, strong over venter; s.l. somewhat simple, L1 at 55 mm. est., 40 per cent. +; Vesulian, or Bathian; France.

"*Ammon. arbustigerus* bildet zusammen mit *Ammon. planula* d'Orb. (*Ammon. Wagneri* Oppel non Neumayr) eine besondere Gruppe [von *Procerites*] welche den *Proplanuliten* nahesteht" (Siemiradzki, p. 315). But *Am. arbustigerus* is possibly a Zigzagiceratid, though s.l. is insufficiently developed.

PROPLANULITES, Teisseyre 1887, (*Amm. Baliner Ool.*; Verhandl. K. K. Geol. Reichs., p. 48) "*Proplanulites Koenighi* Sow. sp. Czerna"; (p. 54).

"*Proplanulites Koenighi* Sow. sp. Das betreffende Exemplar dieser aus den Baliner Oolithen wohlbekannten Art hat einen zweispitzigen Antisiphonallobus. Doch ist dieses Merkmal schon innerhalb dieser Art unbeständig. . . *Proplanulites* n. gen., welches ausser der genannten Art noch einige andere als neu zu beschreibende Formen umfasst, wird von mir an entsprechender Stelle näher charakterisirt werden."

The genus is founded on "*Propl. Koenighi*" (sic) from the Balin Oolite—this specimen of Teisseyre's from Czerna thus becomes the genoholotype: it is figured (with its suture-line?) by Teisseyre (*Proplan.*; Pamiet. mat. Akad. Krak. XIV, 1887, iv, 1, v, 1). The two-pointed antisiphonal lobe is, perhaps, as he says, "unbeständig," inconstant—possibly an abnormality.

S.l. with EL about equal to, but often rather less than L1; ES and S1 equal in depth; L2 and aux. ll. rather degenerate. S.l. degenerates much in some series, L1 passing from c. 40 per cent. of breadth of whorl to c. 20 per cent. and less. Periphery has two forms: (1) subgibbous, sides subparallel, venter full; (2) subcuneate, sides converging to a narrow venter: it carries two modes of ornament: (1) ribs cross venter, though with some weakening—(a) they cross straight, (b) secondary ribs being inclined, they cross with a feeble curve; (2) ribs fail on middle of venter, making a smooth band—a very late attempt to produce the Parkinsonian venter (p. 29)—in some degenerate forms, on cast, a fairly distinct interruption, illustrated by Phillips (*Am. koenighi*, Geol. Yorks. 1829, vi, 24), but exaggerated for his reduced fig. Then, in old age, forms which are subgibbous tend to acquire a subcuneate venter and those that are subcuneate, a subgibbous venter. The rib following any of the obscure Perisphinctean constrictions passes strong over venter in most series. In phaulomorphs, before end of body-ch., a few ribs show strong on venter, finishing off with a sort of collar and short rostrum.

Callovian, England, Kellaways Clay, *koenighi* η, Dorset, Wiltshire;

Kellaways Rock, post-*koenigi* η , Wiltshire; "Kelloway Rock," pars, *koenigi* and post-*koenigi*, Yorkshire; Scotland, Sutherland; Roof Bed, *koenigi*. Also France (Normandy, Deux Sèvres and Ardennes); North-West Germany, and Poland.

A—C. Nomomorphs (and a megalomorph); body-ch. $1-1\frac{1}{4}$ whorls, not found complete; mouth not known, plain? A. S.l. subelaborate, L1, c. 40 per cent. 1. Venter subcuneate, rounded, smooth. Max. c. 450 +; usually c. 200.

P. majesticus, nov. *Perisph. könighi*, Neumayr (Balin, xi, 2), *Per. obtusicosta*, Petittclerc, non Waagen, (Call. 1915, VII, 3). Large; 22 primary ribs. Well represented in Neumayr's fig., but costation remains strong for about another half-whorl in the holotype. Umbilicus concentric, strongly ribbed; periphery narrowly rounded, smooth, but ribs may sometimes be followed across it. Approximation of s.l. to the style of *Perisph. obtusicosta*, Waagen, and the likeness in form, suggest a common origin for *Obtusicostites* and *Proplanulites*—Petittclerc's identification is witness.

Geol. Surv. Engl. No. 30533, Chippenham, Wilts; Kell. Clay (a); Holotype; S. 133, 37, 27, 35; L1 at 47 mm., 42.5 per cent.; max. c. 210. Neumayr's specimen, also from Chippenham; F. 127, 35, 27, 36; max. c. 210; Petittclerc's, Deux-Sèvres, France; T. 132, 38, 26.5, 37.

P. basileus, nov. An involute form with heavy ribs in the umbilicus, cf. *Am. könighi* Neumayr, Balin, xi, 3. Smooth stage begins about 190 mm. diam., 18 ribs in a whorl up to that, 17 ribs up to 95 mm. Geol. Surv. Engl., 30741; Chippenham; Kell. Clay (b), [from a large septarian nodule]; S. 147, 38.5, 25, 30; 236, 37.5, 25.5, 35; wholly septate; max. c. 465 +; L1 at 56 mm., 40 per cent., at 88, 36 per cent. This is a megalomorph, representing perhaps the acme of size for *Proplanulites*.

P. laevigatus, nov. Becoming smooth at about 95 mm.; about 15 ribs whorl before that; involute, then excentrumbilicate; Geol. Surv. Engl., ex Darrell, Coll., 30686; Holotype; Rampisham, Dorset; K. Clay (b); S. 83, 44, 26.5, 26; 92, 43.5, 25.5, 26; 147, 40, 24, 29; according to mark on test about $1\frac{1}{4}$ wh. body-ch. = max. c. 190; L1 at 37 mm., 35 per cent.

*. A. 2. Venter subgibbous.

P. teisseyrei, Tornquist, 1894, (Proplan.; Zeit. Deutsch. Geol. Ges., XLVI, p. 562); Pl. XLV, 1a—d; Holotype; Callovian; Pourcandes, Mézières, (Ardennes), France; 18 ribs about radial. L1 at 28.5 mm., 42 per cent.; F. 90, 39, 27, 33. *P. teisseyrei*; R. Douvillé, 1908, (Céph. Call. d'Argences; Mém. Soc. Linn. Norm. XXIII), VIII, 8, 9; Argences, Normandy; F. 65, 37, 25.5, 35; L1 at 22.5, 42 per cent.: umbilicus is wider at a smaller size, therefore more excentric.

A. 3. Venter subcuneate, crossed by ribs.

P. sp. P. arciruga, Teiss., IV, 9; v, 9c, (non IV, 5), Czerna, Balin, Poland; F. 42, 40.5, 26, 35; 22 ribs; L1 at 12.5 est., 40 per cent.

Near this is No. 30534, Geol. Surv. Engl., "Christian Malford?" [Wilts]; K. Clay (b); S. 38.5, 37, 28, 33; 23 ribs; L1 at 12.5 mm., 38 per cent.

P. ferruginosus, nov. Thinner than *P. koenigi* (Sow.), with forward bending ribs and more developed s.l. Ribbing less conspicuous than in *P. opimus* and periphery narrower. Geol. Surv. Engl., 26105; Holotype; Scarborough, Yorks.; Kell. R. (d), brown ferruginous; S. 57, 40, 27, 26; 21 ribs; 99, 41, 26, 28.5; L1 at 24 mm., 33 per cent.; at 31 mm., 37 per cent.

P. sp. P. subcuneatus, Teiss., iv, 13a, v, 13 b, c, seems from its subelaborate s.l., L1 at 21·5 est., 34 per cent., to belong to this series.

A. 4. Venter subgibbous, crossed by ribs; a, secondary ribs curved.

P. curvus, nov. *Ammonites koenigii*; Brauns, Jura nordwest. Deutschl., 1869, p. 133; Pl. I, f. 1; Porta Westphalica; Macrocephalenschichten; Holotype. Like *P. opimus*, but with a regularly concentric umbilicus. T. 90, 40, 26·5, 31·5.

P. opimus, nov. Like *P. arcigura [arciruga]*; Tornquist, 1894, XLVI, 2, and like *P. koenigi*, Sow. sp.; but ribs incline more forward and pass over venter; s.l. is well developed. Primaries 17, mostly trifurcate, one intercalate usually; ribs [in young, fairly radial], later bending more and more forward, passing over venter, somewhat weakened, making a slight U-curve. Geol. Surv. Engl., 26085, Chippenham, Wilts; Kell. Rock (d); Holotype; S. 55, 40, 30, 30; 85, 40, 29, 32; max. c. 130; L1 at 25, 38 per cent. No. 26095, Id.; S. 65, 40, 31·5, 32; L1 at 20·5, 36·5.

A. 4, b. Secondary ribs nearly straight.

P. tornquisti, nov. *P. koenigii*; Tornquist, 1894, p. 552; XLIV, 1, Holotype; Pourcandes, Mézières (Ardennes), France; Callovian; F. 110, 37, 33, 38; L1 at 29·5, 34 per cent.; 19 ribs.

P. sp. P. arcigura [arciruga]; Tornquist, 1894, XLVI, 2; Chippenham, Wilts; F. 43, 37, 31, 35; F. 80, 36·5, 29, 32·5; "T. 70, 38, 30, 35, size 80," p. 568. G.S.E. No. 26100; S. 46, 39, 30·5, 30·5; No. 26098; S. 39, 42, 32, 29·5; both Chippenham, Kell. R. (d), associate better here than with *P. opimus*.

P. cracoviensis, Tornquist, 1894, p. 558. Name given to *P. koenighi*, Teisseyre 1887, (Pam. Ak. Krak. XIV, iv, 1, 2, v, 1, 3, 4). These are syntypes. Take as lectotype, iv, 1. Fig. 1b shows ribs crossing venter more plainly than in *P. koenigi* (Sow.), agreeing with the A. 4 series. The only difficulty is its? s.l.—L1 (fig. 1d) works out to no more than 31 per cent.; but that of his v, 3b, is 37 per cent.

If the identification of *P. koenighi*, Teiss., as morphic equiv. of *P. koenigi* (Sow.) and a member of the present series be correct, it means that this series is the typical one for *Proplanulites*. Czerna; F. (1a, b) 59, 41·5, 30·5, 29; F. (1c) 53, 42, 33, 30; 18 ribs; genoholotype.

P. sp., P. könighi, Neum., Balin, xi, 3. Like next stage to *P. lævigatus*, widening of umbilicus beginning earlier; Balin; F. 83, 38·5, 28, 31; 16 ribs, radial. Thickness seems too great, and ribs are depicted crossing venter; both characters are against association with *P. lævigatus*; but make it a possible terminal of this series.

B. Nomomorphs; s.l. subsimple, c. 30 per cent. 1. Venter sub-cuneate.

P. polonicus, nov., *P. arciruga*, Teiss. iv, 8, v, 8, Filipowice, Poland; Holotype (non Teiss., iv, 5); F. 50, 37, 26, 34; 20 ribs; F. 73, 38, 26, 34; 22 ribs; L1 at 20·5 mm. est., 31·5 per cent. Geol. Surv. Engl., No. 7693; Rampisham, Dorset; K. Clay (a); a brephomorph; paratype; S. 47·5, 37, 24, 34; 18 ribs; L1 at 13 mm., 31 per cent.

P. occultus, nov. Morphic equiv. of *P. lævigatus*, but with more and smaller ribs—18 to 78 mm. diam.—and less developed s.l. Geol. Surv. Engl., ex Huddleston Coll., No. 30775; Rodborne, Malmesbury, Wilts; Kell. Clay (a); inner whorls and part of outer, wholly septate; S. 70, 41·5, 28, 27·5; 158, 39, 23·5, 30; L1 at 31 mm., 31 per cent., at 59 mm. 30; max. c. 290+.

P. latus, nov. Like *P. koenighi*, Teiss., iv, 1, but thinner, and with smaller, narrower ribs; like *P. subcuneatus*, Teiss., iv, 11, but with

broader whorls and smaller umbilicus. Ribs about radial, mostly trifurcate, with occasional additions, fading away on periphery. Geol. Surv. Engl., 26106; Scarborough; Kell. R. (c), grey oolite with pinkish tinge, decomposing in places to ferruginous; Holotype; S. 57, 40, 27, 26; 68, 40, 27, 28; 21 ribs; LI at 17 mm., 29.5 per cent. Tutchter Coll., Chippenham; K. Clay (c); a colomorph; S. 53, 43.5, 28, 25; 18 ribs; LI at 22, 27 per cent.

B. 2. Venter subgibbous. Max. c. 100 mm. +.

P. koenigi, J. Sowerby sp. 1820; CCLXIII, 3, Holotype; F. 57, 38.5, —, 32.5, 17 ribs on last whorl; "Charmouth [Dorset]," III, 113; loc. not correct. Rampisham, Dorset, 13 miles N.E. by E. of Charmouth, from which fine specimens of *Proplanulites* were obtained by Mr. D. S. Darell, F.G.S., in similar lithic condition to Sowerby's fig. 3, may well be original locality.

Geol. Surv. Engl., ex Darell Coll., 7688, Rampisham, Dorset; K. Clay (a); Topotype? S. 57, 41, 33 (30), 30; 18 ribs; specimen, 66 mm. full; 17 ribs; max. c. 108 mm. LI at 17, 31 per cent. G.S.E., ex Hudleston Coll., No. 30774, Chippenham, Wilts; K. Clay (a); S. 109, 41, 30, 28.5; 15 ribs; LI at 26.5, 30 per cent.; about one whorl body-ch.; max. c. 130. A mutation? G.S.E., 30537, Weymouth, Dorset; K. Clay (b), black (nodule from clay); S. 67.5, 38, 29.5? 31; 16 ribs to 57 mm.; LI at 21.5, 32.5 per cent.

C. 1. Nomomorphs; s.l. degenerate; LI, c. 25 per cent. 1. Venter subgibbous, smooth. Max. c. 130 mm. +.

P. laboratus, nov. Coarsely ornate; 17 ribs; somewhat stout periphery; indication of expanding umbilicus; very like *Perisph. könighi*, Neumayr, = *P. majesticus*, but umbilicus beginning to be excentric, periphery more obtuse, s.l. simple. Geol. Surv. Engl., ex Darell Coll., 7685, Rampisham, Dorset; K. Clay (a); S. 71, 39, 31, 34; 117, 37, 28, 37; about one whorl body-ch., mark as if body-ch. continued for another whorl; max. = $1\frac{1}{4}$ whorl body-ch. = c. 130; LI at 28, c. 23 per cent.

P. fabricatus, nov. Like *P. laboratus*, but not quite so stout; umbilicus wider and more excentric. Tutchter Coll., [Chippenham]; K. Clay (a); S. 71, 38, 29, 42; max. c. 95.

P. involutus, nov. Cf. *Per. könighi*, Neum., XI, 3, but periphery more obtuse. Whorls broader, umbilicus more excentric than *A. koenigi*, Sow. Morphic equivalent of *P. laevigatus*, but has degenerate s.l. Geol. Surv. Engl., 30531; Holotype; Chippenham, Wiltshire; black; S. 57, 44, 28, 26; 92, 39, 28, 30; 15 ribs to 57 mm. diam., 18 ribs to 92 mm. LI, at 21.5, 26 per cent. No. 7692, Rampisham, Dorset; S. 107, 40, 28, 30; 14 ribs; signs of becoming smooth; body-ch. showing nearly a whorl, its mark certainly another half-whorl = body-ch. $1\frac{1}{4}$ whorl + = max. c. 140 mm. +; mark continued around whorl, perhaps colour-band; No. 30538, Wilts; LI at 21, 26 per cent.; 30527, Chippenham; S. 65, 41.5, 28, 27.5; 13 ribs; LI at 23, 25 per cent.; all Kell. Clay (b).

P. lentus, nov. A thinner development of *P. involutus*, with more numerous smaller ribs, and with umbilicus beginning to open out at a small diameter. Geol. Surv. Engl. 26092; Holotype; Kellaways, Wilts; Kell. Rock (d); S. 69, 40, 25.5, 30; 20 ribs to 57 mm. diam.; 19 ribs to 69 mm.; max. c. 130; LI at 25, 20 per cent.

C. 2. Venter subcuneate; a. laterally costate (secondary ribs strong).

P. apparatus, nov. *P. subcuneatus*; Tornquist, 1894, XLVI, 4; Pourcandes, Mézières, (Ardennes), France; Callovian; Holotype; F. 61, 35, 26, 39.5; 92, 33, 23.5, 42.5; 22 ribs. S.l. very degenerate, L1 at 23 mm., 17 per cent.

C. 2, b. laterally obscuricostate (secondary ribs feeble).

P. pourcandiensis, Tornquist 1894, XLVI, 1; Holotype; Pourcandes, Mézières; Callovian; F. 102, 40, 29, 30; 15 strong primaries, secondaries obscure. Lobes like those of *P. subcuneatus* [= *P. apparatus*], Tornquist dixit; but great difference in style of ornament.

D. E. Phaulomorphs; body-ch., usually preserved, 3/4 whorl or less; with lat. auricle, or signs of it, and short rostrum; max. not 100 mm. and decreasing; L1, c. 29 per cent. or less. D. 1. Venter smooth, subcuneate, sometimes subtabulate towards end of body-ch.

P. subcuneiformis, nov. *P. subcuneatus*, Teiss., IV, 12, (F. 71, 35, 27, 38; 22 ribs; L1 at 18 est., 30 per cent.; Poland). Tutchter Coll. Christian Malford, Wilts; K. Clay (a); Holotype; S. 71, 36.5, 26, 37; 82, 36, 25, 40; 22 ribs; max. c. 94; L1 at 19, 29 per cent. Cf. also *Am. koenigi*; Damon, Geol. Weym., 1880, I, 1; F. ("reduced") 90? (64.5), 34, —, 40; 19 ribs. Number of ribs agrees with next sp. but concentric umbilicus with this; Weymouth; [K. Clay]. Colomorphs, Geol. Surv. Engl. 30529, Chippenham, Wilts; S. 32, 39, 25, 24; 30536, "Christian Malford?"

P. subcuneatus, Teisseyre, IV, 14, v, 14b,c; Holotype; F. 61, 41, 24.5, 34.5; L1 at 25 est., 32 per cent., seems too much. Czerna, Poland.

P. auriculatus, nov. Coarsely ornate, 17 ribs, mostly trifurcate, occasionally extra intercalate; excentrumbilication marked. Like *P. subcuneiformis* (*P. subcuneatus*, Teiss., IV, 12), but has 17 ribs at same diam. which are stronger, while periphery is quite obtuse towards end of last whorl; umbilicus also is smaller at first, the widening in last whorl being rapid. Geol. Surv. Engl., 30526; Holotype; Chippenham; S. 71, 35, 26 (23), 37; L1, at 16 mm., 24 per cent.; has lateral auricle and collar. Id., No. 30528, Chippenham; S. 72, 32.5, 25, 38; L1 at 18 mm., 22 per cent.; collar and base of lateral auricle: both Kell. Clay (a). A fragment (cast) comparable with this sp., Geol. Surv. Scotl., No. M.1656g., On shore, Lower Brora, Sutherland; Roof Bed; shows peripheral interruption plainly.

P. capistratus, nov. Small; rather coarsely ornate, 17 ribs, mostly bifurcate, one intercalate; not much excentrumb.; complete with mouth-border (auricle and collar). Geol. Surv. Engl., 30532, Holotype, Chippenham; K. Clay (a); S. 61, 32, 24.5 (22), 40; L1 at 14.5, 21.5 per cent. This is a smaller edition of *P. auriculatus*, with a similar number of strong primaries; but it is thinner and much more umbilicate. Paratype, G.S.E., ex Hudleston Coll., No. 30778; Gristhorpe, Yorkshire; Kell. R., soft, ferruginous; S. 54, 29.5, 25, 40.

D. 2. Venter subgibbous. a. Paucicostate.

P. rudis, nov. Like *P. subcuneatus*, Teiss., IV, 14, but stouter, fuller in venter, and with rather stronger ornament. Ribs mostly trifurcate, with an occasional intercalate; about radial, but slightly flexed; venter smooth. Geol. Surv. Engl., 30525; Chippenham; K. Clay (c); indications of lat. auricle and collar; S. 61, 41, 28 (26), 36; 88, 34, 26, 39; 19 ribs; L1 at 19 mm., 25 per cent. A brephomorph (this sp.?), No. 30539, Wiltshire; K. Clay. Another example? damaged; G.S.E., ex Hudleston Coll., No. 30776; Loudon, Chippenham; S. 52, 39, 27 +, 33.5.

D. 2, b. Multicostate.

P. arciruga, Teisseyre, iv, 5; v, 5c, d; Holotype; Filipowice, Poland. Distinguished by the large number of fine ribs and by their crossing a rather full venter without break; F. 47·5, 36, 24, 38; 32 ribs; L1 at 12·5 mm. est., 27 per cent. A similar smaller specimen, G.S.E., ex Hudleston Coll., No. 30777; Gristhorpe, Scarborough, Yorkshire; Kell. R.; S. 26, 34·5, 29, 42; full size of specimen c. 30 mm., with 27 ribs, mostly trifurcate, passing over venter.

P. oidaleus, nov. Inner whorls, so far as can be seen, like *P. arciruga*, Teiss., iv, 5, but umbilicus narrower. Outer whorls more of pattern of *P. subcuneatus*, Teiss., iv, 12, but ribs smaller and more numerous, venter broadly rounded, crossed by ribs, especially in young; body ch. inflated, rather more than half-whorl, complete with lateral lappet and indication of short ventral rostrum. Geol. Surv. Engl., 26093; Holotype; Kellaways; S. 71, 35, 29·5, 39·5; 25 ribs. No. 26084, a colomorph, this sp.?; shows signs of swelling, has a rounded venter crossed by ribs, Chippenham; S. 47, 40, 27·5, 32; L1 at 18, 28 per cent. No. 26102, similar, Kellaways; all Kell. R. (f).

E. Phaulomorphs. Whorls subparallel, venter subtabulate, 1. Stout.

P. stiphrus, nov. *Am. koenigi*, J. Sow. CCLXIII, 2? (F. 39, 36, 34? 37; 19 ribs). Stout and crassicostate; ribs about radial, heavy, mostly trifurcate, an occasional one intercalate, crossing rounded, later flattish venter with very faintest forward bend; umbilicus rather small, concentric. Geol. Surv. Engl. 26088; Kellaways; Kell. R. (e); Holotype, with beginning of body-ch.; S 41, 37, 34, 34; 16 ribs; L1 rather long and narrow; at 13 mm., 26 per cent.; No. 26086, Id.; septate; S. 36·5, 39, 36, 34·5; 17 ribs.

E. 2. Somewhat stout.

P. petrosus, nov. Primary ribs 19, bifurcate, usually also an interpolated secondary; ribs run radial to cross periphery with a little weakening and very feeble forward turn. S.l. very degenerate, almost ceratitic; L1 at 9 mm., c. 22 per cent. Like *Proplanulites haugi*, Parona & Bonarelli (T. 50, 35, 25, 40), but whorl almost quadrate in shape while ribs are straight on side and not distinctly bow-shaped on venter. General likeness to *Perisph. omphalodes*, Waagen (see p. 42), but that has different run of coarser ribs, no intercalated ribs, and the ribs pass strong over venter. Geol. Surv. Engl., 26091; Kellaways; Kell. R. (e); Holotype; S. 39·5, 33, 33, 43; 19 ribs; size of specimen, 43 mm.; about $\frac{5}{8}$ whorl body-ch., nearly complete.

P. lyprus, nov. Cf. *Am. koenigi*, J. Sow., CCLXIII, 1. Like *P. petrosus*, but thinner; ribs cross periphery with slight weakness, except just before mouth, where they are strong; they have usually no bend forward on periphery, only towards last part of body-ch. is there a slight indication of it. Body-ch. $\frac{1}{2}$ whorl; lateral auricle, c. 8 mm. long + ?, 3 mm. broad. Geol. Surv. Engl., 26080; Holotype; Kellaways; Kell. R. (e); S. 37, 34, 28·5, 41; 21 ribs; No. 26103, Id.; S. 32, 36, 30, 39; 23 ribs; signs of constrictions; on cast, at beginning of body-ch., peripheral interruption strong, almost Parkinsonian (Cosmoceran).

E. 3. Somewhat thin.

P. tridens, nov. *P. teisseyrei*; Douvillé 1908 (VIII, 2, 4; Argences, Normandy; F. 33, 35, 31, 39·5; 23 ribs). Whorls not so stout and ornament less marked than in *P. petrosus*, ribs about radial, 3 secondaries to a primary, though one is not always joined up. Geol. Surv. Engl., 26090; Holotype; Kellaways; Kell. R. (d); S. 39·5, 33, 30·5, 40·5; 22 ribs; about $\frac{1}{4}$ whorl body-ch. (incomplete).

P. trifurcatus, nov. Cf. *Am. koenigi*, J. Sow., CCLXIII, 2, but Sowerby seems to show a thicker shell. Cf. *P. arciruga*, Teiss., IV, 9, but ribs more prorsiradiate and whorls more parallel-sided than that. Ribs 19, mostly trifurcate, periphery rather obtuse, umbilicus fairly concentric. Tutcher Coll., [Kellaways; Kell. R. (d)]; Holotype; S. 48, 38, 29, 34; max. c. 66; LI at 14, 23 per cent.

P. excentricus, nov. Like the last, but the umbilicus up to the same size is much smaller, then it rapidly widens, becoming decidedly excentric, while primary ribs tend to become heavy. More excentric than any of the D. I series, with more obtuse periphery. Body-ch. $5/8$ whorl, almost complete, and from likeness of terminal part to that of D. I series may be expected with auricle. Tutcher Coll.; [Kellaways; Kell. R. (d)]; S. 45, 42, 29, 24.5; 71, 38, 26, 35; 19 ribs; LI at 19, 18 per cent. A smaller, somewhat more costate example, a polished section, body-ch. $5/8$ whorl with sign of lat. auricle, Geol. Surv. Engl. 26094, Kellaways; Kell. R.; S. 62, 37, 26? 34; 17 ribs.

A similar specimen, but primaries less strong, G.S.E., ex Hudleston Coll., No. 30779; Gristhorpe, Yorks.; Kell. R.; S. 63, 35, 28, 35; 19 ribs; LI at 14 mm., 18 per cent. This example has lat. auricles. It is much like *P. teisseyrei*; Douvillé, 1909, VIII, 8, 9, except for s.l. *P. pourcandiensis*, Tornquist, 1894, XLVI, 3, given as *P. teisseyrei*, Tornquist, p. 562; Poix-Terron, Mézières; Callovian; F. 92, 38, —, 34; LI at 25 mm., 22 per cent.: is much like No. 26094, but is larger.

E. 4 Thin.

P. partitus, nov. Cf. *P. arciruga*, Teiss., IV, 5; but ribs stronger and fewer, 22 as against 32; cf. *P. haugi*, Parona & Bonarelli, but lack of forward sweep of ribs on venter; distinct interruption on cast, beginning body-ch. Primaries, fairly marked, bifurcate, with, usually, one intercalate; ribs, almost radial, sometimes slightly flexed. Geol. Surv. Engl., 26099; Kellaways; Kell. R. (f); S. 41, 34, 26, 40; about $5/8$ whorl body-ch., nearly complete; LI, c. 18 per cent.

P. rufus, nov. Cf. *Am. koenigi* Phillips, (Geol. Yorks 1829, VI, 24; F. 90 (30), 33, 27? 35). Like *P. arciruga*, Teiss., IV, 5, but fewer ribs and smaller, more excentric umbilicus; like *P. subcuneatus* Teiss., IV, 12 (= *P. subcuneiformis*), but with ventral part of body-ch. flatter and more swollen. Body-ch. about $5/8$ whorl; at beginning, on cast, shows peripheral interruption as depicted, but somewhat exaggerated, by Phillips. Geol. Surv. Engl., 26104, Scarborough; Kell. R. (f), ferruginous oolite; S. 47.5, 37, 21? 33; 74, 32, 27, 40; about 24 ribs; LI at 18 mm., c. 22 per cent.

P. fulvus, nov. Somewhat like *P. arciruga*, Teiss., IV, 5, but with a decidedly excentric umbilicus; like *P. rufus*, but with broader whorls and smaller umbilicus. Ribs prorsiradiate, with a slight bend forwards near venter, usually trifurcate, tending later to be bifurcate, with intercalations when primaries increase in size. Venter, up to well on in body-ch., with a distinct narrow, flat area and costal interruption. Geol. Surv. Engl., No. 26097; Holotype; Kellaways; Kell. R. (f); S. 53, 38, 24, 30; 74, 35, 24, 38; 23 ribs; body-ch. over $\frac{1}{2}$ wh., nearly complete; LI at 19, 20 per cent.; No. 26083, Chippenham; Kell. R., from top by decomposed condition; S. 67, 37, 24, 36; 21 ribs; body-ch. c. $5/8$ wh., complete on inside area, with indications of lat. auricle—outer part broken. Tutcher Coll.; [Kellaways, Kell. R.]; S. 45, 39, 27, 33.5; 56, 35, 25? 36; body-ch. about $3/4$ whorl, nearly complete; LI at 13, 21 per cent.; another ex. same Coll. [and Loc.] from top K.R. by condition; S. 39, 37, 25.5, 34; 53, 34, 24.5? 33; 24 ribs; body-ch. just over

$\frac{1}{2}$ wh., almost complete; venter rather rounded; flat area not shown. Geol. Surv. Engl. 26087; Kellaways: Kell. R.; brephomorph (this sp. ?); No. 26101, Id.; colomorph (this sp. ?).

P. fracidus, nov. Like *P. fulvus*, but has the umbilicus more closed in the young stage, consequently the umbilical excentricity is

TABLE II, CHRONOLOGY, PROPLANULITES

STRATAL NAMES	PRESUMED STRATAL SEQUENCE	PRESUMED FAUNA	DISTRIBUTION
S.W. ENGL.	YORK-SHIRE (S.W. ENGL.)		
KELLAWAYS ROCK	f. Sands and Sandstone (<i>fracidus</i>)	<i>capularis</i>	Wilts
		<i>fracidus</i>	"
		<i>fulvus</i>	"
		<i>rufus</i>	Yorks
		<i>partitus</i>	Wilts
		<i>oidaleus</i>	"
		<i>arciruga</i>	Poland; Yorks
	e. Sandstone Doggers (<i>Crassiplanulites</i>)	<i>lyprus</i>	Wilts
		<i>petrosus</i>	"
		<i>stiphrus</i>	" ; Russia.
KELLAWAYS CLAY	d. Sands and Sandstone (<i>opimus</i>)	<i>Crassiplanulites</i>	" ; Russia.
		<i>excentricus</i>	Wilts; Yorks; France
		<i>trifurcatus</i>	"
		<i>tridens</i>	"
		<i>lentus</i>	"
		<i>ferruginosus</i> & aff.	Yorks; Poland
	c. Dark Clay (<i>rudis</i>)	<i>opimus</i> & aff.	Wilts; France; Germany; Poland
		<i>latus</i>	Wilts; Yorks
		<i>polonicus</i>	Poland; Dorset
		<i>rudis</i>	Wilts
KELLAWAYS CLAY	b. Septarian Nodules (<i>basileus</i>)	<i>involutus</i>	Dorset; Wilts
		<i>laevigatus</i>	Dorset
		<i>basileus</i>	Wilts
	a. Light Clay (<i>majesticus</i>)	<i>capistratus</i>	Wilts; Yorks
		<i>auriculatus</i>	" ; Scotl.
		<i>subcuneatus</i>	Poland
		<i>subcuneiformis</i>	Dorset; Wilts; Poland
		<i>fabricatus</i>	Wilts
		<i>laboratus</i>	Dorset
		<i>occultus</i>	Wilts
		<i>koenigi</i>	Dorset; Wilts
		<i>majesticus</i>	Wilts; France

greater. Geol. Surv. Engl. No. 26082, Chippenham; Kell. R. (f) from near top, judging by decomposed condition; Holotype; S. 50, 42, 24, 28; 76, 41, 24?, 34.5; LI at 17.5, c. 25 per cent. — lopsided; body-ch. c. $\frac{5}{8}$ whorl, nearly complete; No. 30530, Id., "Oxf. Clay" [Kell. R. matrix]; a brephomorph, this sp. ?

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TYPE AMMONITES

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Part XXVII

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F. Phaulomorph, or catamorph—a degenerate serpenticone.

P. capularis, nov. Much smaller than *P. fulvus*, but somewhat like a dwarf of it. Ribs radial, mostly trifurcate; umbilicus fairly concentric; venter with interruption, on cast, beginning of body-ch., but, at end, ribs cross strongly just before mouth: this had a raised rostrum (collar) and indication of lat. auricle. Geol. Surv. Engl., 26081; Chippenham; Kell. R., top, by decomposed condition; Holotype; S. 43, 36, 19, 39.5; c. 24 ribs; body-ch., c. 5/8 wh.; L1, c. 22 per cent.; No. 26096, colomorph. this sp.? Kellaways; Kell. R.

Perisphinctes cf. *spirorbis*; Neumayr, 1871, Balin, x1, 4, has much of characters of *P. capularis*; if so, it would be a biologically earlier form of this series. Ribs 23; F. 69, 36, 22, 38; Balin.

Proplanulites haugi, Parona & Bonarelli (Call. inf. Savoie, 1895, p. 157, x1, 4), does not fit into any of these series. It is distinguished by arcuate curve of ribs on venter. Other species which have been figured as *Proplanulites* are even more separable.

Excluding these, 37 species of *Proplanulites* have been mentioned by name, and some others have been referred to. Supposing the existence in each series of morphic equivalents in corresponding numbers, then the possible tale of species should be about 60. This number seems large, but these species certainly lived during two hemeræ which in Wiltshire are marked by considerable difference in deposit: it is quite possible that they may have lived during 5 or 6 hemeræ; for the lack of correspondence in the distribution of *Proplanulites* and *Kepplerites* indicates a lack of synchronization, suggesting that the so-called Kellaways Clay is of more than one date. Similarly the difference in distribution of *Proplanulites* and of *Cadoceras* and of *Sigaloceras* suggest that the Kellaways Rock, or its equivalent, is a polyhemeral deposit.

In Great Britain strata with *Proplanulites*-fauna are preserved at only a few places: on the whole Continent there seems to be only about as many localities showing the strata as in Great Britain—the wide area of almost total destruction of Continental strata with *Proplanulites*-fauna is thus indicated.

Table II (p. 40) gives the presumed chronology of *Proplanulites* and *Crassiplanulites*, interpreted from matrix, condition and similarity.

CRASSIPLANULITES, g. n. Genoholotype, *C. crassicosta* nov. Comparable with *Obtusicoelites* (p. 42), but with less developed s.l.: it is intermediate between that of *Obtusicoelites* and series *A* of *Proplanulites*; and with ribs curving forward towards venter, which they cross in weakened condition, making a U-curve; [later, fading away and producing a smooth band]. Possible European equivalent and contemporary of *Obtusicoelites*. Differs from *Proplanulites* in its massive proportions, more developed s.l., EL as long as L1, S1 deeper than ES, greater difference between L1 and L2 in size, rather more curvature to secondary ribs, and the tendency to produce a smooth band between primary and secondary ribs. L1 about 45 per cent. of whorl-breadth.

Callovian, Kellaways Rock (e); England (Wiltshire), see Table II, p. 40. Also Russia

C. crassicosta, nov. "*Am. bakeria*." Ribs stout, undulate, 20 primaries, mostly trifurcate; ribs carried over periphery with a slight forward sweep, and some weakening in size—the latter becomes more pronounced towards end of whorl; wholly septate; mark of another whorl; possibly only inner part of a much larger specimen, see next species.

The general aspect is that of *Perisphinctes obtusicosta*, Waagen, Kutch, (Pal. Ind. 1875), xxxviii, 1, but with wider umbilicus, though whorls are quite as stout: ribs not so strong over venter; s.l. more of *Proplanulites* pattern. Geol. Surv. Engl., 25649; Kellaways, Wilts; Kell. R. (e); Holotype; S. 65, 37, 34, 35; 141, 37, 34 (31), 35.5; 18 ribs to 84 mm. diam.; 20 to 141 diam.; max. c. 250 +; L1 at 33 mm., 47 per cent.; at 45 mm., 45 per cent. (Pl. CCXXVIII).

C. crassiruga, nov. "*Ammonites bakeriae* (9 ins. diam.);" H. B. Woodward (Mid. Ool. Engl.; Mem. Geol. Surv., V, 1895, p. 30). Like *C. crassicosta*, but with broader, thinner whorls and smaller, more excentric umbilicus; ornament not so heavy as regards primaries; but secondaries about the same size, though rather more distant; tends to develop a smooth area between primaries and secondaries, and the latter fade into venter to produce the smooth band. Loss of ornament commences about 230 mm. Geol. Surv. Engl., 4744; N. of turning to King's Mead Mill, S.W. of Little Somerford (Somerford Parva), near Malmesbury, Wilts (H.B.W.); Kell. R. (e), "calcareous sandstone"; S. 141, 39, 27 (25), 33; 22 ribs; 238, 36, 28, 36; c. 23 ribs; size of specimen c. 250, with about $\frac{1}{4}$ whorl body-ch.; max. c. 435; L1 at 55, 42 per cent., at 78, 40 per cent. There are marks of whorl-continuation up to about a diameter of 400 mm., with umbilicus then c. 39 per cent.

C. lahuseni, nov. *Perisphinctes koenigii*; Lahusen, (Jur. Rjasan; Mém. Com. Géol. I, 1883) Pl. ix, f. 2, Holotype; f. 1 a, b, c, Paratype. The s.l. which Lahusen depicts, the dimensions which he gives (p. 63) and the description (p. 94) certainly seem to fit *Crassiplanulites*—a species the next step onward from *C. crassiruga*. The smaller specimen (illustrated) appears to be its immature stage: it shows a smooth band on lat. area; Swistowo, (Rjasan), Russia; Holotype; T. 350, 33, 23, 43; L1 at 72 mm. est., 37.5 per cent.; Paratype, T. 98, 37.5, 28.5, F. 34?; L1 at 32 mm. est., 43 per cent.

OBTUSICOSTITES, g. n. Genoholotype, *Perisph. obtusicosta*, Waagen, Kutch (Pal. Ind.), 1875, xxxviii, 1. Strong ribs run straight over obtuse periphery; [s.l. complicated, L1 with a broadened (palmate) ending, c. 50 per cent.]. Callovian, "*anceps zone*," India.

A. Nomomorphs. *O. paramorphus*, Waagen sp., Kutch, XLVI, 1, lectotype; XLVI, 2; XLVII, 3, s.l.; L1 at 53 mm. est., 56 per cent.; *O. obtusicosta*, Waag. sp., xxxviii, 1, lectotype and genotype; xxxviii, 2, s.l.; L1 at 49 mm. est., 51 per cent.; xxxviii, 3.

B. Phaulomorphs. *O. omphalodes*, Waag. sp., xxxvii, 2, with lateral auricle; *O. dhosaensis*, Waag. sp., xxxviii, 4, with lateral auricle; L1 at 11.5 mm. est., 53 per cent.

KINKELINICERAS, g.n. Genoholotype, *Proplanulites kinkelini*, Dacqué, (Jura von Ostafrika; Beitr. Pal. Geol. Öst.-Ung., 1910, XXIII, p. 36), Pl. v, f. 1; vi, 3. Primary ribs not so swollen as in *Proplanulites*, and thus less difference in size between primaries and secondaries, while the latter tend to run on to the inner area in between the primaries. They also pass fairly strongly over venter, with a very feeble forward curve, but without median loss of strength. [S.l. (p. 37, fig. 17) of pattern of *Proplanulites majesticus*, (Pl. CCXXVI), but L1 not so palmate. L1, at 27.5 mm. est., 43.5 per cent.].

Callovian, [c. *Crassiplanulites* horizon?], East Africa; India, teste Dacqué; possibly England.

A. Nomomorphs. *K. kinkelini*, Dacqué sp., v, 1, vi, 3, Lectotype; vi, 1, 2.

K.? sp. Dacqué cites *Perisphinctes spirorbis*; Waagen, Kutch,

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XL, [XLI], 2, as synonym of his *P. kinkelini*, but specific agreement seems not quite satisfactory; generic is possible, but without s.l. is not proved.

B. Phaulomorph. *K. pendambilianum*, Dacqué sp., VI, 4, with indication of a small lateral auricle.

Family TULITIDÆ, nov.

Cadicones passing to serpenticonic, directly or by way of sphærocone stage. The various genera to which species have been attributed by authors indicate the changes of development and morphic equivalence. Ornament of low relief, often of distant character, knobs on junction of inner margin and venter, no real lateral area; (OVL₂); costæ cross venter, usually with marked forward sweep. All ornament passing away, sooner or later, ventral ornament retained longest: the feebleness of ornament and the passing to smoothness, even in cadicone stage, characters of the family. Suture-line simple, of pattern of simple-lobed Sphæroceratidæ, retraction of marginal portion only slight.

Teloceras, *Emileia* and *Erymnoceras*, or the coronates of the families Stepheoceratidæ, Sphæroceratidæ and Pachyceratidæ, are comparable—catagenetic development is similar. S.l. prevents association with Stepheoceratidæ; character of ribbing does not concur with Sphæroceratidæ—the sphærocones of that and of Tulitidæ are obviously independent developments; shape and s.l. have more suggestion of Pachyceratidæ, but the feebler development of ribbing, leading to smoothness, the considerable sphæroconic development and the difference of s.l.—ES and SI about equal in depth, instead of decidedly unequal—suggest the advisability of separation. The Tulitidæ and the other three families are all offshoots of a coronate cadicone radical, the Tulitidæ occupying a geological position between the Bajocian and the Callovian coronates.

England, Bathian (Falaisian), Fullers' Earth Rock of Dorset and Somerset; Great Oolite of Gloucestershire and Oxfordshire; France, Alsace (Schlippe); Deux Sèvres, Vendée, etc., (*Amm. bullatus* and *microstoma*, d'Orbigny, presumably belong to the family); Germany, Baden (Schlippe); Wurtemberg, various *bullatus*-like forms: Lithuania (Siemiradzki). The family is of particular interest as showing the contemporaneity of the Fullers' Earth Rock of South England with the Great Oolite of Gloucestershire-Oxfordshire, and thus that the Fullers' Earth Rock is later, not earlier, than the Stonesfield Slate. Genera of the family occur in at least two distinct deposits of the Great Oolite—the Minchinhampton Shelly Beds, which are oolitic, and another bed of the same place, which is non-oolitic. In the same way they mark at least two deposits of Fullers' Earth Rock—the brownish Milborne Beds and the white Thornford Beds (S. Buckman, Brach. of Namyau Beds; Pal. Ind. III (2), 1918, 237).

Genera, *Tulites*, *Tulophorites*, *Madarites*, *Pleurophorites*, *Rugiferites*, *Sphæromorphites*, *Bullati-morphites*, *Morrisites*, nn., with *Morrisiceras*, S. Buckman, to be removed from the Sphæroceratidæ (T.A. III, 1920, p. 22).

It is necessary to notice, as belonging to the Tulitidae, Morris & Lycett's species, *Ammonites subcontractus* (Moll. Great Oolite, Pal. Soc., 1850, p. 11, Pl. II, figs 1, 1a). The word species must be read in the plural, for their figures "are composites, drawn from two different

species from two different matrices (two horizons)"—S. Buckman, Brach. Namyau Beds; Pal. Ind. III (2), 1918, 235. The two specimens are in the Museum of the Geological Survey of England, numbered 25610 and 25615. The first, which is mainly depicted (reduced $\times 0.79$) in fig. 1, and has the aperture preserved, is from the Shelly Beds of Minchinhampton—a creamy coloured limestone with shell fragments and many small white oolitic grains: it bears the original label in Lycett's handwriting, "*A. subcontractus*, M. & L. Gr. Ool. M—hampton." The second specimen is a much larger shell, with a depressed aperture: the general shape of the specimen is represented in fig. 1a, but the apertural edge is taken from the small example. The large specimen is from a hard, fawn-coloured, non-oolitic limestone, presumably an earlier deposit than the Shelly Beds, but it does not seem quite to fit the descriptions either of the Weatherstones or of the Basement Bed (Lycett, Cotteswold Hills, 1857, p. 94).

In their description (p. 11) of *Ammonites subcontractus* Morris & Lycett give the dimensions of the large specimen—"Diameter, 5 inches. Thickness, 3 inches. Height of aperture, $1\frac{1}{2}$ inches." These figures will read as T.127, 30, 60, —; their fig. 1a yields F. 68, 31, 53, —; and the large specimen gives S. 123, 36, 57, 33. Their fig. 1 yields F. 68, 32.5, —, 41; the small specimen gives S. 86, 35, 51, 35—both figure and specimen being measured a little behind the aperture, which contracts rather suddenly. It may, therefore, be seen that though the authors say "the specimen from which our figure is taken," the illustrations 1 and 1a are really synthetographs—fig. 1, in the main, fits the small specimen; but the height of the aperture has been reduced under the influence of the large example; while fig. 1a fits the large example, but the apertural margin is put in from the small specimen. Of the description, the main part fits the small shell, but the dimensions are those of the large one. The remark, "proportion of umbilicus to diameter rather more than one-half," is incorrect, even if taken from upper edges instead of from contact-lines. The umbilicus of the small specimen is only partially excavated, not so much as is depicted in fig. 1; while that of the large example had not been excavated at all. The facts pertaining to the figures and descriptions make it necessary to treat the two specimens as syntypes. As the small example shows the "subcontract" character more plainly than the large one, because it has the mouth complete, it is chosen as the lectotype.

Morris & Lycett attribute the feebleness of ornament to the process of clearing away the original matrix. This is not the case: the small specimen shows some signs of abrasion before entombment, the large specimen does not. Ornament of very feeble relief passing to complete smoothness is a character of the *Tulitidæ*.

Tulites, g.n. (*Stephanoceras*, *Cæloceras* Auctt.). Genotype, *T. tula*, n. Cadicones of *Erymnoceras* aspect, with funnel-shaped (crater-like) umbilicus, walls almost superimposed, only feeble gradation; walls of umbilicus make a sharp junction with venter, and carry bullæ of low relief; an earlier stage—primary costæ ending with short spines (Teloceratan) seems to be indicated. S.l. with short, narrow L2 and small aux. 2, the latter turned towards venter (askew): cf. Siemiradzki's fig. cit. sub *T. cadus*. Distinguished from *Erymnoceras* by feebler ornament and by ribs curving forward over venter, also by suture-line. There is reason to conclude that Siemiradzki's figure of s.l. is taken from an example of *T. cadus*, and represents the s.l. of this genus: only the inner part observable in genotype. England; Lithuania.

T. cadus, n. *Stephanoceras* m.f. *coronatum*, Schlotheim, Bruguière spp., Siemiradzki, (*S. coronatum* von Popilany; N. Jahrb. Min. 1882, II, p. 255, fig. [2], p. 256). A massive cadicone of *Teloceras* and, later, of *Erymnoceras* aspect, with no sign of degeneration. [Minchinhampton] Gloucestershire, Great Oolite, Shelly Beds; S.B., ex J.B., Coll. 2182; Holotype; S. 77, 37, 85, 35; 125, 43, 86, 35: "Sherborne, Dorset" [Milborne Wick, Somerset]; Fullers' Earth Rock (Milborne Beds); S.B., ex Darell, Coll. 2760; Paratype; S. 53, 36, 93, 34; 72, 36, 89, 35; about half-whorl body-chamber: Popilany, Lithuania; Bath[formation], (Siemiradzki),

T. tula, n. Like *T. cadus*, but degeneration, smoothness and reduction of whorl—incipient serpenticonic stage—sets in at about 85 mm. diameter; body-chamber about $1\frac{1}{4}$ whorl; "Sherborne, Dorset," [Milborne Wick, Somerset]; Fullers' Earth Rock, (Milborne Beds); S.B., ex Darell, Coll. 1263; Genotype and Holotype; S. 56, 38, 93, 37?; 80, 40, 73, 35; 98, 34.5, 49, 38.5; about $1\frac{1}{4}$ whorl body-chamber, all but complete.

T. subcontractus, Morris & Lycett sp. *Am. subcontractus*, M. & L., op. cit. p. 11; Pl. II., fig. 1 (pars), see above p. 43. A cadicone like *T. tula* up to about 60 mm. diam., but with less strong ornament; then degeneration—smoothness and contraction. Test preserved, but worn; mouth-border also preserved—a plain band preceded by a ventral ridge of low relief, and that is preceded by another still less strong; between the two presumably a thickening of test, making a constriction on cast, which should be especially noticeable on lateral area. Minchinhampton, Gloucestershire; Great Oolite, Shelly Beds; Geol. Surv. Engl., ex Lycett Coll. 25610; Lectotype; S. 49, 37, 80, 34; 86, 35, 51, 35; max. 90.

TULOPHORITES, g.n. Genotype, *T. tulotus*, n. Somewhat of *Tulites* stage in inner whorls, but umbilicus distinctly gradate, with edge of umbilical wall well rounded off. Ribs on venter less strong, more approximate, and less persistent than in *Tulites*. [S.l. with L2 somewhat elaborate, broad, its longer part inside]. England.

T. præclarus, n. In shape like what would be expected between *Tulites cadus* and *T. tula*, but with less development of ornament. Indication of end of mouth with strong contraction on cast. Troll, near Thornford, Dorset; Fullers' Earth Rock, (Thornford Beds); S.B., ex J.B., Coll. 1914; Holotype; S. 82, 39, 87, 33; 137, 32, 50, 38; max. 140.

T. tulotus, n. Somewhat like *T. tula*, but with a more contracted and gradate umbilicus, and with less pronounced ornament. End-portion of body-chamber partly preserved, showing deep constriction on cast; preceding, on ventral area, are about half-a-dozen distant, broad ribs of low relief, gradually increasing in strength—the last before constriction being fairly strong. Troll, near Thornford, Dorset; Fullers' Earth Rock (Thornford Beds (hard stone); S.B., ex J.B., Coll. 1920; Genotype and Holotype; S. 66, 42, 88, 27; 110, 36, 51, 35; max. c. 118.

MADARITES, g.n. (*Stephanoceras*, *Teloceras*, Auctt.). Genotype, *M. madarus*, n. Cadicones passing towards serpenticones. Slight sign of *Tulites* stage in inner whorls of genotype up to about 45 mm. diam.; some undulation of upper edge of inner margin for about another half-whorl indicates attempt to continue *Tulites* stage. Except for this, after about 45 mm. diam., long before cadicone stage is complete, pronounced smoothness is established. [Anamorphs should show more distinct *Tulites* stage]. Umbilicus deep, contracted, funnel-shaped, with deep walls nearly superimposed in cadicone stage. S.l. simple, L1 broad, not quite so long as EL; L2 expanded, longest part towards

venter. Gloucestershire and Dorset. This genus is distinguished by the pronounced development of smoothness: there are no ventral ridges developed towards end of body-chamber. The direction of growth-lines across venter show that anamorphs and brephomorphs should have forwardly-arched ribs. The genus is also distinguished by the deep funnel-shaped umbilicus. Had the cadicone stage persisted with relative narrowing of umbilicus, a sphærocone would have been produced: but whorl-reduction and umbilical expansion came on too early. It shows, however, how the sphærocones of the Tullitidæ (*Sphæromorphites* and the *bullatus*-like forms) have been produced.

M. madarus, n. (*Ammonites subcontractus*, Morris & Lycett, op. cit., p. 11, dimensions; Pl. II, fig. 1a, pars). Thin test preserved, not abraded; body-chamber nearly complete. Minchinhampton, Glos; Great Oolite, a greyish, fawn-coloured, hard, non-oolitic limestone, presumably part of the Weatherstones or of the Basement Bed, or from a local deposit associated with them, but not specially noted; Geol. Surv. England, ex Lycett, Coll., 25615; Genotype and Holotype; S. 76, 41, 82, 30·5; 123, 36, 57, 33; max. c. 130.

M. calvus, n. Like *M. madarus*, but much thinner, because reduction in thickness—incipient serpenticonic stage—begins at a much smaller diameter. Test partly preserved, thin, especially on body-chamber. Troll, near Thornford, Dorset; Fullers' Earth Rock (Thornford Beds—from a hard layer, not unlike the matrix of *M. madarus*); S.B., ex Darell, Coll. 1917; Holotype; S. 63, 40, 76, 26; 80, 39, 65, 29; 99, 37, 56, 32; max. c. 108.

M. pravus, n. Like *M. calvus*, but reduction in thickness of whorl commences at a smaller diameter, and is pronounced enough to produce a contracticone. Umbilical expansion also becomes considerable. Troll, near Thornford, Dorset; Fullers' Earth Rock, Thornford Beds—a stratum with a slight pinkish tinge, not quite so hard as the matrix of *M. calvus*; S.B., ex J.B., Coll. 1921; Holotype; S. 61, 41, 69, 29·5; 73, 33, 68, 35·5; 92, 30, 44, 39; max. c. 108.

RUGIFERITES, g. n. Genotype, *R. rugifer*, n. Cadiconic passing to incipient serpenticonic with rounded venter; costate, (not nodate), primary ribs of low relief, slightly rursicostate on inner margin, then becoming about radial; secondaries do not pursue course of primary, but start forward at somewhat of an angle, and sweep with a fairly good curve over venter; some trifurcation of primaries, sometimes by later furcation of second secondary. As umbilicus opens, primaries tend to fail; secondaries remain, but become distant folds of low relief—somewhat of *Morrisiceras*-pattern. S.I. simple, but lobes somewhat long; EL. longer than LI, L2 broad, in two branches, the outer tridactyloid, the inner simple, the incision between not deep, just deeper than between lobules of outer branch. England, Dorset.

R. rugifer, n. S.B., ex J.B., Coll. 1916, Holotype; Troll, near Thornford, Dorset; Fullers' Earth Rock, Thornford Beds, a hard grey limestone; S. 54, 46, 70, 26; 91, 38·5, 49·5, 35; max. c. 100; body-chamber about a whorl; S.B. Coll. 2762, ex F. H. Butler, Paratype; "Sherborne, Dorset" [Fullers' Earth Rock, Thornford Beds], a hard, grey, crystalline limestone; S. 29, 35, 61, 33; 38, 43, 71, 31·5; c. 28 primary ribs producing about 68 secondaries; some irregularity in size of ribs and some suggestion of constrictions.

PLEUROPHORITES, g. n. (*Macrocephalites*, Auctt.). Genotype, *P. pleurophorus*, n. Sphæroconic passing to incipient serpenticonic; costate, primary costæ little larger than secondaries—the costæ begin

with a slight backward curve, then come forward to sweep with a very slight forward arching over venter; no sign of smooth stage, nor of costal degeneration, in the two species examined, but there is the beginning of umbilical expansion. England, Dorset.

Sphæroconic shape, and ribs with regular sweep, not angulate, good distinctions from *Rugiferites*.

P. pleurophorus, n. A costate sphærocone, without any sign of umbilical expansion. S.B., ex J.B., Coll. 1919; Genotype and Holotype; Troll, near Thornford, Dorset; Fullers' Earth Rock (Thornford Beds—a rather soft bed, with a slight pinkish tinge, and also some suggestion of bluish argillaceous matrix); S. 56, 45, 82, 23?; 74, 42, 82, 22; size c. 95, not suitable for measurement, as the specimen is an allomorph; about 35 primary and 75 secondary ribs; max. c. 105.

P. polypleurus, n. A sphærocone commencing serpenticone by slight umbilical expansion, but without any sign of costal degeneration. About 32 primary ribs produce about 85 secondary—junction obscure, partly due to preservation, partly to intercalation. S.B., ex J.B., Coll. 1927, Holotype; Troll, near Thornford, Dorset; Fullers' Earth Rock, (Thornford Beds—a stratum similar to that of *P. pleurophorus*, perhaps harder, not so much sign of argillaceous resting place); S. 60, 41, 69, 25; 92, 40, 55, 27; max. c. 105.

BULLATIMORPHITES, g.n. Genotype, *Ammonites bullatus*; Lycett, 1863, (non d'Orbigny), Moll. Great Ool., Suppl., p. 4; Pl. xxxi, f. 1; cf. *Am. bullatus*; *latecentratus*, Quenstedt; Amm. Schwäb. J., II, p. 658; Pl. LXXVII, 6. Sphæroconic passing to serpenticone by excentrumbilication; costæ (at first approximate, then somewhat distant, later approximate again) of low relief, often trifurcate, some sign of angularity of *Rugiferites* pattern in the distant stage, later more regular curve, radial; mouth-border laterally contracted with good forward sweep; immediately before border a fairly marked constriction in cast [not shown if test present?]; s.l. incomplete, simple? England, Gloucestershire; (Germany, Swabia?).

The genus is nearest to *Pleurophorites*, but is distinguished by its mode of coiling.

B. bullatimorphus, n. *Am. bullatus*; Lycett, cit. Geol. Surv. Engl., ex Lycett Coll., 25620, Holotype and Genotype; "near Tiltups Inn, two miles south of Nailsworth, [Gloucestershire]; Great Oolite" (Lycett, p. 4), from a whitish, weathering ochre, hard, crystalline, limestone, feebly oolitic, but many oolite grains (?) show in cast of body-chamber; test thin, preserved on inner whorls and part of outer; S. 100, 48, 53+, 19; 179, 34, 33, 39; max. 183; s.l., only indications; body-chamber $1\frac{1}{4}$ whorls; no sign of any smooth stage.

B. latecentratus Quenstedt sp. (*Am. bullatus latecentratus*, Quen. 1887, LXXVII, 6). This appears to be a smaller edition of *B. bullatimorphus*; "Laufen, [Württemberg]; Brauner Jura c."

MORRISCERAS, S. Buckman, 1920, (Legend of Pl. CLXVII, T.A. III); Genotype, *Morrisiceras sphæra*, S.B., Holotype = *Macrocephalites morrissi*, Auctt. Cadicones which pass to incipient platycones through a sphærocone stage. [Primary ribs not developed into knobs, bifurcating into rather strong secondaries in cadicone stage] and becoming obsolete; sphærocone stage characterized by secondary ribs only, crossing venter with a slight forward curve, and strongest in middle of venter; [they disappear in incipient platycone stage, when complete smoothness supervenes, correlated with excentrumbilication and whorl-reduction. S.l. simple, lobes short and broad, L1 about 38 per cent. of

breadth of whorl, L2 somewhat bifid—the outer part the larger, but rather shorter]. England, Dorset, Somerset.

M. korustes, n. Cadicone passing to sphærocone; whorls somewhat galeatiform; undulation of edge of inner margin indicates relics of *Tulites*-stage or its costate equivalent; umbilicus gradate, deep; s.l. with short, broad lobes, L1 at 19 mm., c. 40 per cent. "Somerset; Fullers' Earth [Rock]"; J.W.T. Coll.; S. 44, 41, 73, 25; 59, 49, 79, 21; size 63 mm.; max. c. 70.

M. tolmerum, n. Sphæroconic, with rather heavy ventral ribs; a less massive shell than *M. sphæra*, with a larger umbilicus. S.B. Coll. 454; Holotype; Laycock, Milborne Wick, Somerset; Fullers' Earth Rock (Milborne Beds); S. 51, 45, 63, (17?); 77, 47, 67, 16; max. c. 80; S.B. Coll. 2763, Paratype; same loc., "top of F.E. Rock," confirmed by condition; S. 29, 41.5, 65, 27.5; inner whorls showing a costate stage analogous to that of *Rugiferites*; S. 50, 46, 70, 17; max. c. 66; J.W.T. Coll.; [Somerset]; S. 47, 44, 69, 17.5; 67, 48, 67, 17; max. c. 70.

M. sphæra, S. Buckman 1920, Legend of Pl. CLXVII. A sphærocone with a quite small umbilicus; "near Sherborne, Dorset" [Milborne Wick, Somerset]; Fullers' Earth Rock [Milborne Beds]; S.B., ex J.B., Coll., 1923; Holotype; S. 65, 48, 69.5, —; 99, 51, 66, 10; max. c. 105.

M. homœoticum, n. The homœomorph of *Am. morrisi*, Oppel, see sub *Morrisites*: it is distinguished by a slight difference of ribbing, by an umbilicus not gradate and not undercut, by suture-line. Sub-sphæroconic, with a quite small umbilicus, and a suggestion of its opening out again. S.B., ex J.B., Coll. 2758, Holotype; S. 74, 50, 64, —; 91, 48.5, 59, 12; max. c. 105; s.l. with short, broad lobes, L1 at 29 mm., c. 38 per cent.: S.B. Coll. 2757, Paratype; Milborne Wick, Som.; "F.E.R. Top" (Milborne Beds), near surface by condition; S. 45, 49, 54, (17?); 69, 52, 63, 12.

M. comma, n. A scaphitoid; passing from sphærocone to incipient serpenticone; a quite small umbilicus rapidly opens out, has a comma-like appearance; smooth stage attained; s.l. decidedly degenerate, with quite short, broad lobes, L1 at 25 mm., 24 per cent.; J.W.T. Coll., Holotype; Shepton Montague, Somerset; F. E. Rock (Milborne Beds); S. 51, 50.5, 69.5 (4?); 91, 40, 45, 23; max. c. 95; body-chamber nearly complete, end showing tendency to renewed inflation.

M. sknipum, n. Much compressed, with a quite small umbilicus. Like *M. comma*, but much thinner in costate stage (presumed smooth stage not preserved). S.B., ex Darell, Coll. 2759, Holotype; Milborne Wick, Somerset; Fullers' Earth Rock, [Milborne Beds, near surface by condition]; S. 62, 48, 53, 15.

MORRISITES, g.n. (*Stephanoceras*, *Macrocephalites*, Auctt.); Genotype, *A. morrisi*, Oppel, Geol. Surv. Engl. Coll. 25617. Like *Morrisiceras*, with, presumably, similar evolution; differs internally by more elaborate s.l., externally by finer, more numerous ribbing, undercut umbilical wall and suspicion of constrictions; s.l. with lobes somewhat long and narrow, EL. about 75, and L1 about 55 per cent. of whorl-breadth; L2 in two branches, with a deep incision. England, Gloucestershire; Dorset; Germany, Baden (Schlippe), perhaps; see later, p. 49.

M. fornicatus, n. Like *Morrisiceras korustes*, but with smaller, more numerous ribbing; whorls in arch-form (*fornicatus*), but not quite so strong as those of *M. korustes*; S.B., ex J.B., Coll. 2761, Holotype; marked "Sh." = Sherborne, Dorset, possibly some part of the Fullers' Earth Rock outcrop running S. of Sherborne; matrix grey, hard, some-

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TYPE AMMONITES

BY

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Part XXIX

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what shelly stone, different from Milborne or Thornford Beds—more like latter, but sharp preservation of specimen differs; S. 29, 43, 67, 31; 45, 44, 77, 22; max. c. 65, presumably a brephomorph; EL at 11.5, c. 80 per cent., L1, c. 55 per cent.

M. morrisi, Oppel sp. (*Am. macrocephalus*, var., Morris & Lycett, 1850, Moll. G. O., p. 12; Pl. II, f. 3; *Am. morrisi*, Oppel, 1857, Juraf. p. 478; *Am. viator*; Lycett, 1863, Moll. G. O. Suppl., p. 121). The specimen which furnished Morris & Lycett's figure is the holotype of Oppel's species; but the original figure is misleading: it shows only about 40 ribs, which are much too strong, whereas the specimen has about 60 ribs which are quite feeble. As Morris & Lycett's figures of *Am. subcontractus* are synthetographs (see above, p. 43), and as they speak of several examples of this species, it may be suggested that their figures in this case are also synthetographs. The rib-characters which they show are those of *Morrisiceras*, which, however, I have not yet seen from Gloucestershire. If their figures are synthetographs, then their specimens are syntypes, and it will be necessary to choose the specimen now described as the lectotype of Oppel's species: this is in Geol. Surv. England, ex Lycett Coll., no. 25617, from "Minchinhampton, Gloucestershire; base of Great Oolite," Lycett 1863, cit.—a soft, cream-coloured, crystalline, barely oolitic stone, perhaps the Oven-Bed of Lycett (Cotteswold Hills, 1857, 93, 94); S. 45, 51, 63, 15.5; 61, 45, 66, 15; max. c. 85+, the specimen being septate to the end.

The peculiar overhanging wall of the gradate umbilicus is not shown by Morris & Lycett: what they have is the umbilicus of *Morrisiceras*.

SPHÆROMORPHITES, n. *Macrocephalites* Auctt. Genotype, *S. sphæroidalis*, n. Sphaerocone; umbilicus narrow, deep, somewhat elliptical, walls superimposed, with tendency to become overhung; ornament feeble, some undulation on upper edge of inner margin is, presumably, relic of *Tulites*-stage of nodosity; feebly undulate costulae cross the venter with a forward sweep; there are signs at intervals of something like constrictions; s.l. simple; EL longer than L1, which at 16 mm. is about 44 per cent., L2 rather long and narrow. England, Dorset.

S. sphæroidalis, n. Cf. *Macrocephalites morrisi*; Schlippe, Bath. Oberrhein.; Abh. geol. Spec.-k. Elsass-Lothr., IV (4), 1888, 199; VII; *Am. bullatus*; Quenstedt, Amm. Schwäb. Jura, 1887, LXXVII, 9. Like the early stage of Schlippe's species, but less costate, and certainly not possessing a concave inner margin. Quenstedt's cited figure illustrates a like, but more narrowly umbilicate, form; not congeneric as s.l. is different, especially the broad L2. S.B., ex Darell, Coll. 1918, Holotype; Troll, near Thornford, Dorset; Fullers' Earth Rock, Thornford Beds, but a matrix distinct from that of the other species, as it is an argillaceous limestone; S. 31.5, 41, 92, (30?); 44, 45, 86, 27; 55, 51, 84, 20; max. c. 75.

There are further species of Tulitidæ which do not fit these genera. For instance, *Stephanoceras subcontractum*; Schlippe, 1888, VI, 1, has the shape of *Tulophorites*, but ribbing comparable with *Pleurophorites*; his *Macrocephalites morrisi*, Pl. VII, is doubtfully a *Morrisites*: fig. 1 seems to show a concave inner margin, which it is unlikely that *Morrisites* would develop—if correctly shown in this respect, Schlippe's form belongs, presumably, to a genus between *Morrisites* and *Sphaeromorphites*. Then the bullati figured by d'Orbigny and Quenstedt seem to indicate several genera: *Am. platystomus globulatus*, Quen., 1887, LXXVIII, 2, is near to

Pleurophorites: *Am. bullatus*; Quen., LXXVII, 9, is near to *Sphæromorphites*, but differs as already mentioned.

CHRONOLOGICAL SEQUENCE: For the English Tulinidæ this is important. There are the following data: in the Fullers' Earth Rock of Dorset-Somerset brown (ironshot) limestones (Milborne Beds); are later than the whitish, chalky limestones (Thornford Beds); in the Great Oolite of Gloucestershire shelly, oolitic beds are later than whitish, non-oolitic beds. Thus the genera of Tulinidæ occupy two distinct horizons. But more analysis is possible, by observation of smaller differences in the matrices of the various specimens.

Certain technical terms may facilitate this and future enquiries. For instance, the Thornford Beds, the Milborne Beds and the Minchinhampton Beds are all similar in character, in that they are limestones: therefore they may be said to be **homœopetrous**; but they are distinct from argillaceous or arenaceous strata: the Lower Fullers' Earth Clay and the Fullers' Earth Rock are **heteropetrous**. But the Milborne Beds (ironshot), the Thornford Beds (chalky, not oolitic) and the Minchinhampton Beds (the upper part, oolitic and shelly) differ from one another in a minor degree: they are **heterolithous**; but any one of these deposits shows still further differences: the Thornford Beds are not sequentially **homolithous**,—the matrices of the Tulinids show appreciable differences, though these differences have not been sufficient to induce any observer to make a detailed section of the beds exposed in Troll quarry—some 5 feet: the need for such detail was not understood. But, as these beds show such differences, they must be classed as **homœolithous**; not as homolithous; while the differences are presumed to indicate differences in time of deposition—a chronological sequence: such surmise is justifiable, because the heterolithous differences between the Thornford and the Milborne Beds indicate a known sequence. The sequence within the Thornford Beds must at present be a matter of surmise. Knowledge may be gained by noting which are isochronous deposits of different areas—those beds which are **isidophorus**, yielding species equal in value (*ἴσος*, equal, *εἶδος*, form, or species, *φορὸς*, bearing), being regarded as isochronous. The yielding of the same species is not insisted upon; but beds in two areas which yield species of, say, *Tulinites* are reckoned as isochronous, until there be evidence to the contrary. By a parity of reasoning beds which do not fulfil such condition, beds which are **anisidophorus**, are, presumably, anisochronous, not equal in date. These are the arguments of similar and dissimilar faunas carried out on limited groups of organisms, like, for instance, Ammonites: therefore words compounded of species (*εἶδος*) are considered as more desirable than any compounded with fauna: the latter should have a general application. For arguments and methods of work with regard to the phenomena of similar (limited) faunas (isidophory) and dissimilar faunas (anisidophory) the author's papers on Jurassic Chronology (Quart. Journ. Geol. Soc., LXXIII, 1918, 257; LXXVI, 1920, 62) may be consulted.

GEOLOGICAL SEQUENCE: Working on the methods discussed above, the following geological sequences may be given—as regards major details the succession is known, but as regards minor details it is a case of surmise and inference. However, from what has been said above, and from what is stated in Tables IV, V, the observations upon which the work is based, and the manner in which evidence is used, may be understood.

TABLE III

FULLERS' EARTH ROCK (DORSET—SOMERSET

	STRATA	FAUNA
Milborne Beds	6. Upper part : specimens show that they come from near surface by being soil - stained and having test roughened by secondary deposition from infiltration	<i>Morrisiceras</i> <i>Tulites</i>
	5. Lower part : specimens not roughened	
	4. Whitish stone ; cast ironstained ..	<i>Morrisites</i>
Thornford Beds	3. Hard stone ; cast whitish	<i>Madarites</i> <i>Tulophorites</i> <i>Rugiferites</i>
	2. Rather soft stone ; cast whitish ..	<i>Pleurophorites</i>
	1. Argillaceous stone ; cast yellowish ..	<i>Sphæromorphites</i>

TABLE IV

GREAT OOLITE (GLOUCESTERSHIRE)

	STRATA	FAUNA
Minchin- hampton Beds (a part of)	4. Shelly Beds ; very oolitic	<i>Tulites</i>
	3. Somewhat oolitic	<i>Bullatimorphites</i>
	2. Barely oolitic	<i>Morrisites</i>
	1. Hard, not oolitic	<i>Madarites</i>

By placing together the strata which are isidophorus, and by keeping separate those which do not correspond in species, which are anisidophorous, the following sequence is obtained :

TABLE V

BATHIAN (FALAISIAN)

PRESUMED HEMERAL SEQUENCE

7. <i>Morrisiceras</i>	3. <i>Madarites</i>
6. <i>Tulites</i>	2. <i>Pleurophorites</i>
5. <i>Bullatimorphites</i>	1. <i>Sphæromorphites</i>
4. <i>Morrisites</i>	

This Ammonite-fauna of the Fullers' Earth Rock-Great Oolite strata is the one short and not over-populous break in the remarkable dearth of Ammonites which characterizes—in Great Britain and North France, at any rate—the interval of *hemera* post-*zigzag* to pre-*macrocephalus*: a dearth all the more remarkable from contrast with the exceeding richness in Ammonites of the many preceding and succeeding Ages. This period of Ammonite poverty points to considerable geographical change—more or less it is synchronous with estuarine conditions in East England and in Scotland. But this poverty may not be wholly original: it may have been heightened by wide-spread destruction of ammonitiferous deposits.

The robust character of the genera of the Tullitidæ, their somewhat nautiloid shape, poverty of ornament and rather simple suture-line suggest that they are deep-sea forms which, at any rate in the case of *Tulites* of the Minchinhampton Shelly Beds, have drifted into a shallow water deposit, bearing traces of their journey in the condition of their tests. The Tullitidæ are a stock of Coronati, less developed than their predecessors of the Bajocian. The biological order of the genera is somewhat that in which they have now been described, certainly *Tulites* is least, and *Sphæromorphites* is most changed from the original stock. This biological order is not in accordance with their geological succession; but a more changed series is sometimes the first to arrive in a new area; to be followed later by its less changed cousins, not necessarily in order.

Addendum: A Tullitid has been sent by Mr. J. Pringle, F.G.S., from Oxfordshire: it falls between *Madarites calvus* and *M. pravus*, see p. 46.

Madarites glabretus, n. "*Teloceras subcontractum*." [Cadicone to] incipient serpenticone, only outer whorl preserved, body-chamber (cast) just short of a whorl in length, finished by plain mouth and no constriction. No ornament. Geol. Surv. Engl., No. Pl. 866; from Railway "cutting between Bucknell and Ardley Wood," N.W. of Bicester, Oxfordshire, "found loose, probably from Bed 31, Fullers' Earth Rock, of Mr. M. Odling, F.G.S. (Quart. Journ. Geol. Soc., LXIX, 1913, p. 490), who quotes *Teloceras subcontractum* from this bed" (Mr. J. Pringle): matrix hard, grey, non-oolitic stone; S. 79, 38, 59.5, (34?); 107, 37, 46.5, 36.5; max. 116, somewhat ellipticone.

According to the statements of the quarry foreman, during operations subject to the making of the line, a large Ammonite was obtained from Bed 26 (Odling), that is 4 beds, or about 6 feet above Bed 31: it was handed over to an official of the Great Western Railway. The damaged impression which the foreman showed to Mr. Pringle and myself suggested some relative of what is now named *Bullatimorphites*, but much larger—some 10–12 inches (250–300 mm.)—than anything known at present from Great Oolite-Fullers' Earth Rock strata. Mr. Pringle's attempts to trace the whereabouts of this specimen were not successful; but it is to be hoped that it may be found.

If the suggested relationship be correct, Bed 26 may be of *Bullatimorphites* date, and if Bed 31 be of *Madarites* date, as there is good reason to think, then Bed 28 is left as, possibly, of the date of *Morrisites*. The beds superior to Bed 26, up to, say, Bed 21, are, therefore, possibly of the date of *Tulites* and *Morrisiceras*—that is, synchronous with part of the Minchinhampton Shelly Beds. Bed 31 of Ardley, 4 feet thick, could contain all the Ammonite horizons ascribed to the Thornford Beds, for, at Troll, they are not much thicker.

Family KOSMOCERATIDÆ, Hyatt

Ornati, Runcinati, Auctt. Cosmoceratidæ, Hyatt (Ceph. ; Zittel-Eastman Pal. I, 1900, 587—*Kosmoceras* is Waagens' original spelling : nomenclatorial rules forbid alteration of generic and trivial names ; but a family name must agree with that of the genus). Hyatt placed in Kosmoceratidæ, *Cosmoceras* representing the Ornati, and created *Sigaloceras* for the Runcinati. He also united with them his genus *Phricodoceras*, but this is far removed in date : in that respect and in suture-line it associates with Liparoceratidæ (see T.A., II, p. B and III, Pl. CXLIX).

Mostly serpenticones and platycones (ex coronate cadicones ?) with a specialized venter (see later) and liberally tuberculate on lateral and latero-peripheral areas—the most developed forms carrying two rows of tubercles on each of these areas, that is, six rows on the conch. Often with very long lateral prolongations to mouth-border. Transition in one direction to rounded venter and forms with *Macrocephalites* aspect ; in another direction to almost inornate, amblygastric oxycones, and possibly in another direction to uncoiled forms : the so-called Ancylocerates of the Callovian have the ornaments of the Ornati, and are possible developments of Ornati serpenticones. Suture-line not elaborate, retraction and reclination of umbilical lobes feeble.

Date of existence : Bathian ? Callovian, Divesian ; maximum in Callovian : some of their strata preserved over wide areas in Europe.

The venter, which may be called the Kosmoceratid venter, presents itself in various styles :—

- (1) Runcinate-ornate : a median tabulate area, crossed by straight costæ or subcostæ, bordered by prominences, from swellings to long spines.
- (2) Ornate : median band more or less smooth to quite smooth, tabulate to sunken, bordered by spines, alternate, opposite or intermittent. The spines being septate, and the specimens being usually found as pyritized casts, the length of the spines may fail to be appreciated.
- (3) Runcinate : median band tabulate, crossed by straight costæ, which have no prominences at the angle of junction with lateral area. (Runcinate stage—Neumayr & Uhlig, Kaukasus Jura foss. ; Denkschr. Math. Nat. Cl. K. Akad. Wiss. LIX, 1892, 54).

There are many forms of venter included in the above headings. Some of them are due to change during developments ; but others arise from the differential development of characters in distinct lineages.

The Kosmoceratid venter is one feature distinguishing Kosmoceratidæ from Parkinsonidæ. The runcinate-ornate and the runcinate stages, with ribs running straight and strong across venter, are not found in the Parkinsonidæ : in the true Parkinsonian venter, when ribs are on the median band, they are alternate and curve forwards to fade away in the mid-line. The ornate venter, however, is comparable with that in *Strenoceras*, *Garantiana* etc. ; but is not to be directly connected, as it is not a primitive feature in Kosmoceratidæ : it is, presumably, a modification of certain phases of the runcinate-ornate—therefore, it is of independent origin from that of *Strenoceras* etc. Proof of this is also found in the associated suture-line : it is more elaborate than that of *Strenoceras* and allies.

Further distinction from Parkinsonidæ is the failure of Kosmocerotidæ to produce Perisphinctean forms. The rounded venter crossed by ribs, attained as a late phase by many Kosmocerotids, is the analogue of the Perisphinctean venter; but, in the Kosmocerotidæ, inclusion has by then become too great to produce Perisphincteans: platycones or Macrocephalitoids are evolved. Distinction from *Macrocephalites* is the passage through Kosmocerotid venter, however much this may be masked by later whorls: *Macrocephalites* has no such phase.

KOSMOCERAS, Waagen 1869, (*Am. subradiatus*; Geogn.-Pal. Beitr., II (2), 248), *Cosmoceras*, Auctt. Proposed for the Ornati, all of which named up to that date are therefore genosyntypes. No genolectotype has been chosen. Take as such *Ammonites ornatus rotundus*, Quenstedt, Ceph., 1846, IX, 19, p. 133, = *Kosmoceras rotundum*, Quenstedt sp. The genus is thus to be distinguished by somewhat intermittent, rather feeble tuberculation of lateral area; by smooth, subsulcate venter, bordered by strong spines in alternate position; by suture-line with short EL, rather highly developed and broad L1, fairly long but narrow L2. Germany, England, France, Russia.

KEPPLERITES, Neumayr & Uhlig, 1892 (Kaukasus, p. 53), "Typus *Kepplerites Keppleri* Oppel [sp.]" (p. 55). This leaves it uncertain whether Oppels types or Neumayr & Uhlig's specimen or specimens identified therewith are to be the genoholotypes. Taking all as genosyntypes, advisable to choose Oppel's large measured example as lectotype of his species and genolectotype of *Kepplerites*. Though it has not been figured, its dimensions are given: they read as T. 143, 31, 35, 35. From them and the description (Pal. Mitth. III, 1862, 157), his species is near to *Am. macrocephalus evolutus*, Quenstedt, (Amm. Schwäb. Jura, 1887, LXXVII, I, F. 133, 36, [38], 33), but loses its runcinate stage earlier. [Lobes broad and short according to this identification.] There are possibly several lineages with somewhat similar characters. Germany; "Zone des *Amm. macrocephalus*." England, Cornbrash.

SIGALOCERAS, Hyatt, 1900 (Op. cit. p. 587) "Type S. (*Amm.*) *calloviense*, d'Orb. sp." [Terr. jur. Céph. 1847, CLXII, 10, 11, non *Am. calloviensis*, Sowerby]. A runcinate with fine ornament, costulae sinuous: change over to Macrocephalitoid stage not known. [Suture-line not given, but, presumably, highly developed, with a particularly long EL—about the most florid s.l. of any Kosmocerotid, see T.A. CCLV]. England; France.

GULIELMICERAS, S. Buckman 1920, Legend of Pl. CXCIV; Genoholotype, the example of *G. gulielmi* there figured. A highly ornate platycone, with two rows of lateral tubercles and two rows of short spines bordering a smooth narrow venter. [S.l. simple, with broad, shallow lobes]. Passes into forms with rounded venter, losing ornament. England; Scotland? France; Germany; Russia?

In anamorphs and brephomorphs a venter costate or subcostate between spines is to be expected. Also, in the former, the stage of development of inner row of lateral spines might not be reached.

GOWERICERAS, n. *Kepplerites* Auctt. *Am. gowerianus* group. Genotype, *Gowericeras metorchum*, n., T.A. 1921, CCLIV. Distinct from *Kepplerites* by suture-line—lobes somewhat long and narrow, EL longer than L1—by earlier loss of runcinate stage, by not passing into a Macrocephalitoid stage, but having rather the aspect of an involute *Stepheoceras*. England, Scotland; Kellaway's Clay (a), *majesticus*. Continental occurrence doubtful: to be expected in Deux Sèvres and at Balin.

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TYPE AMMONITES

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

THE AUTHOR

Part XXX

Pp ~~44~~ 55-64 ; 16 Plates

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CORRIGENDA

Page 6, line 11, before '*flavum*' read '*Oxynoticeras*'

P. 7, l. 30, for 'elliptocone' read 'ellipticone'

P. 10, for 'Loch Staffin Beds' read 'Loch Staffin (Argovian) Beds'

P. 18, l. 15 down and lines 1, 2 up, for '*pavlovi*' read '*pavlowi*'

P. 19, *Sagitticeras*. The prior, unfortunately overlooked *Sagittoceras*, does not invalidate *Sagitticeras*. Nomenclatorial rules state that the distinction of a letter is sufficient; therefore, change is not allowed.

P. 22, l. 8 up, for 'well-marked cutting' read 'well-marked, cutting'

P. 26, l. 18 up, for 'holotype' read 'lectotype'

P. 30, l. 10 down, for 'HASELBURGITES' read 'HASELBURGITES'

P. 31, l. 4 down, for 'Congres' read 'Congrès'

P. 31, l. 12 up, for 'ou' read 'où'

P. 32, l. 15 down, for 'kranker' read 'kranke'

P. 34, l. 33, for '*Am. könighi*' read '*Perisph. könighi*'

P. 50, l. 5, delete ' ; ' at end

P. 50, l. 22 up and p. 51, l. 10 up, for 'isidophorus' read 'isidophorous'

P. 50, l. 17 up, for 'anisidophorus' read 'anisidophorous'

P. 50, l. 3 up, for 'Tables IV, V' read 'Tables III—V'

Pl. CXXXVIII A. Alter '*Hildoceras serpentinum*, Reinecke sp.' to '*Hildoceratoides serpentinus*, Reinecke sp.' The sharp swing backwards of the ribs in *Hildoceratoides propeserpentinus* (Pl. CCXVIII) shows the rib-character which Reinecke depicted: it was wrongly thought to be an exaggeration. Therefore *Argonauta serpentinus*, Reinecke, may be expected to have the rather long, narrow L1 of *Hildoceratoides* and so to belong to that genus.

Hildoceratoides has been recognized by Dr. L. F. Spath, F.G.S., as denoting a date somewhat later than that of *Harpoceras falciferum*.

Pl. CXXXVIII B. Alter '*Hildoceras serpentinum* Reinecke sp.' to '*Hildaites serpentiniformis*, nov., Holotype.' The broad and somewhat short L1 agrees with that of *Hildaites subserpentinus*, S. Buckman, Pl. CCXVII. Alter the number of 'Pl. CXXXVIII B' to 'Pl. CCLXVII A': it is hoped to give a further study of this species.

The title of Pl. XII (Vol. I) should be altered from '*Hildoceras levisoni*, Simpson sp.' to '*Hildaites levisoni*, Simpson sp.' The ribs of *Hildaites* are not simple as in *Hildoceras* and *Hildoceratoides*, but are connate towards inner part of lateral area. Absence of a longitudinal lateral furrow distinguishes *Hildaites* and *Hildoceratoides* from *Hildoceras*.

Dr. Spath writes that *Hildaites* marks a date somewhat earlier than that of *Harpoceras falciferum*.

Pl. CXXXIX c, for 'Fig. 2, $\times 2$ ' read 'Fig. 2, Nat. Size'

Pl. CL B, for '28 (24)' read '23 (21)'—see Pl. CCV

Pl. CLIV, for '*Lamberticeras*' read '*Bourkelamberticeras*'—see p. 17

Pl. CLV, for '*Prionoceras*' read '*Prionodoceras*'—see p. 17

Pl. CLXI, l. 3, for '3' read '23'

Pl. CLXV A, for 'Fig. 1 $\times 2$ ' read 'Fig. 1 $\times 2$ '

Pl. CCXIV, after 'S. B. Coll.' add '3314'

Pls. CCXVII, CCXVIII, for 'cit. sp. (species)' read 'cit. spec.' (specimen)

Pl. CCL A, for 'near' read 'near'

Pl. CCLVIIA, l. 4, for 'month' read 'mouth'

EDITORIAL

Volume III is now completed in 12 parts, containing ¹⁹³~~177~~ plates, illustrating 137 species: there are also 3 portraits. Some 50 pages of letterpress deal with chronology, classification and descriptions of many more species: those which have been described, but not illustrated, in the present volume will, it is hoped, find places in the next; but the mass of type-material which has accumulated is very great—much of it is due to the activities of those geologists who take a keen interest in the progress of this work. Where there is so much interesting material, choice as to which should come for illustration is not easy: those specimens which require little labour in the removal of matrix stand the best chance, but specimens of new genera also have strong claims. It is for this reason that the number of genera in the present volume is large—the aim has been to illustrate genera, so as to lay a nomenclatorial foundation, leaving till a later date the building up of the superstructure with the various species of these genera. Already, what has been accomplished in this way in the three volumes is having an appreciable effect on nomenclature: it is not so often necessary to give the unsatisfactory designation, *Gen. nov. aff.* But much remains to be done, for the persistent richness of British Jurassic deposits in regard to Ammonites is a most remarkable phenomenon: in some cases there are preserved in Great Britain certain strata, with rich ammonite faunas, which do not seem to be found anywhere on the Continent of Europe—presumably, these strata have been wholly destroyed there.

To all scientific friends who have kindly aided and encouraged this study of Ammonites, and particularly to Mr. Tutchet, with his valued photographic assistance, the Editor again tenders his hearty thanks. To the subscribers who have so ably supported this work he is equally grateful: he trusts that they will accord the same favour to the fourth volume. To the Council of the Royal Society he would also express kind thanks for material assistance in the shape of grants, which allowed an increase in the number of plates. The author's friend and neighbour, Mr. Walter Blaber, helped towards the same end, giving freely the results of his long experience in the technicalities of book-production and publication: with many thanks the author acknowledges his indebtedness. As the sale of the work in various European countries is greatly hampered by the problem of exchange, all such help is of the greatest value.

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Parts	Pages	Plates	Dates
XIX	1-4, 5, 6	CXXXI—CXXXVI A, B CXXXVII, CXXXVIII A, Portrait (M. Simpson)	22, VIII, 1919
XX	7, 8	CXXXII B, C, CXXXIV B CXXXVI C, CCLXVII (CXXXVIII B) CXXXIX—CXLVII	29, X, 1919
XXI	9-16	CXXXVIII B, CXXXIX B, C CXLVIII, CXLIX A, B, C CL A, B, CLI—CLV	13, III, 1920
XXII	17, 18	CXXXIX D, E, CXLIX D CLVI—CLXV A, B CLXVI, CLXVII	3, VII, 1920
XXIII	19-24,	CLXVIII—CLXXX A Portrait (J. Buckman)	11, IX, 1920
XXIV	25-30,	CLXXX B, CLXXXI A, B CLXXXII—CXCIV	20, XI, 1920
XXV	31, 32	CXCV—CXCIX A, B, CC—CCIII A, B CCIV A, B, CCV A, B Portrait (S. S. Buckman)	8, II, 1921
XXVI	35-40	CCI (reprint), CCVI A, B—CCXX	14, IV, 1921
XXVII	41, 42	CXXXIV C, D, CCXXI A, B CCXXII—CCXXXVIII A, B, CCXXXIX, CCXXX	27, V, 1921
XXVIII	43-48	CCXXXIV (reprint), CCXXXI A, B—CCXXXIV A, B CCXXXV—CCXLIII A, B	28, VII, 1921
XXIX	49-54	CCXLIV—CCL A, B CCLI—CCLVI A, B CCLVII A	5, X, 1921
XXX	1-4, (Title p., etc.) 55-64	CXXXIII B, CCLVII B, C—CCLXI A, B CCLXII A, B—CCLXV A, B CCLXVI A, B	17, XII, 1921

Fig. 1, $\times 0.24$ Fig. 2, $\times 0.24$

AMMONITES BUCKLANDI, J. SOWERBY, 1816

M.C. II, 69; CXXX; *Coroniceras*, S. B., Q.J.G.S., LXXIII, 1919, 302;

"Limefield quarry, N. of Rookhill Farm, Keynsham, Somerset;

Lower Lias"; J.W.T. Coll.; S. 493, 26, 32, 55; max. c. 600

CORONICERAS BUCKLANDI, J. SOWERBY SP.

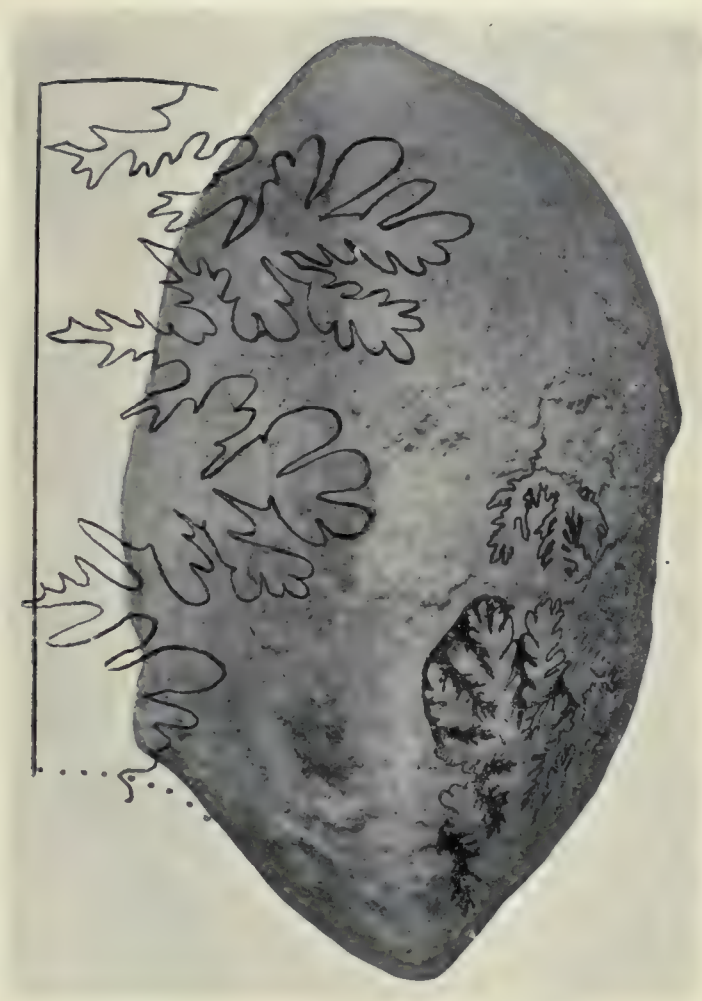
Lymian, *bucklandi*; Topotype

× 0.62



NAUTILUS AMMONOIDES, YOUNG & BIRD, 1828, Holotype
Geol. Yorksh. 271; wholly septate, somewhat crushed, another half-whorl
with umbilical expansion indicated; S. 205, 57? 76, 13? max. c. 266

GOLIATHICERAS AMMONOIDES, YOUNG & BIRD SP.
Argovian, *vertebrale*

Fig 1 $\times 0.62$ Fig. 2
N. S.

NAUTILUS AMMONOIDES, YOUNG & BIRD, 1828, Holotype
 Geol. Yorksh. 271; " [Malton], Yorkshire; Oolite [Limestone]; "
 Whitby Museum, 1276; Fig. 2, Skeleton S.L., Nat. Size

GOLIATHICERAS AMMONOIDES, YOUNG & BIRD SP.
 Argovian, *vertebrale*

Fig. 4 $\times 1.5$

Fig. 1



Fig. 3

Fig. 2

"CARDIOCERAS AMMONOIDES, YOUNG & BIRD SP.

"Cowley, near Oxford; [Lower Calc. Grit (loose siliceous matrix, top of
"Sands)];" S.B. Coll. 2773; S. 43, 43, 56 (50), 31; 81, 47, 54, 25

GOLIATHICERAS AMMONOIDES, YOUNG & BIRD SP.

Argovian, *vertebrale*; Genotype

Fig. 2, $\times 0.81$ Fig. 1, $\times 0.81$

CADICONE CORONOID, with sharpened bullæ
 "Bradford Abbas, [Foss. Bed, up. part], Sherborne, Dorset"
 S.B., ex Darell, Coll. 1243; S. 82, 34, 70, 35; 137, 28, 46, 47; max. 141

DOCIDOCERAS CYLINDROIDES, nov.
 Bajocian, *discites*; Genotype and Holotype

Fig. 1

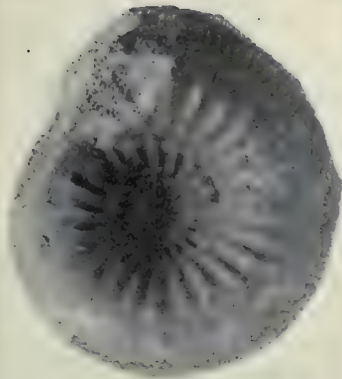


Fig. 2

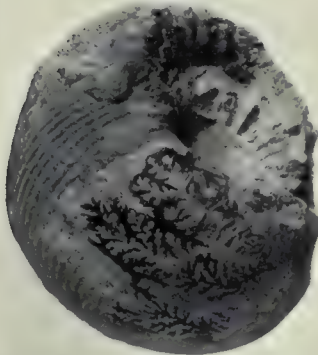
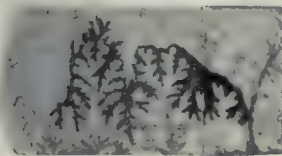


Fig. 3



"AMMONITES HUMPHRIESIANUS"

"Bradford Abbas, Dorset; Inf. Ool.," Foss. Bed, [Mid. part]

S.B. Coll. 3062; S. 34, 34, 76, 25; 49, 36, 76, 32

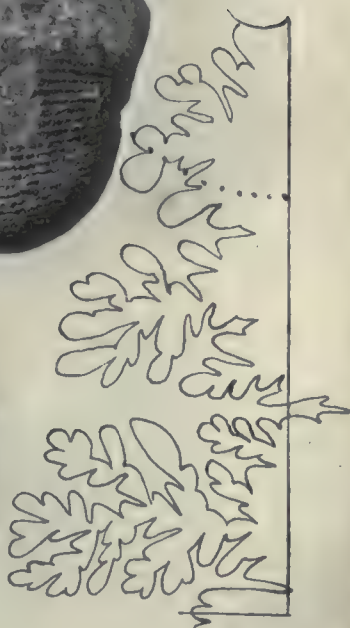
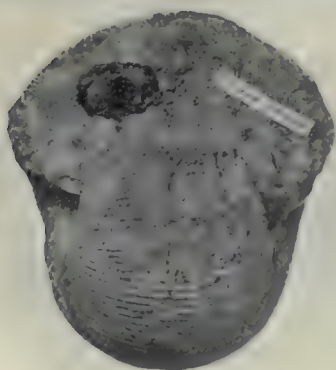
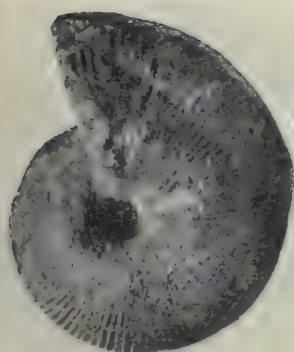
A colomorph, wholly septate

DOCIDOCERAS CYLINDROIDES, S. BUCKMAN 1919

Bajocian, *discites*, (*Eudmetoceras*); Paratype

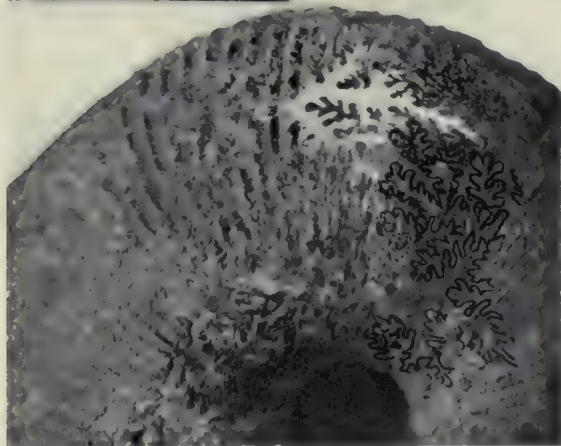
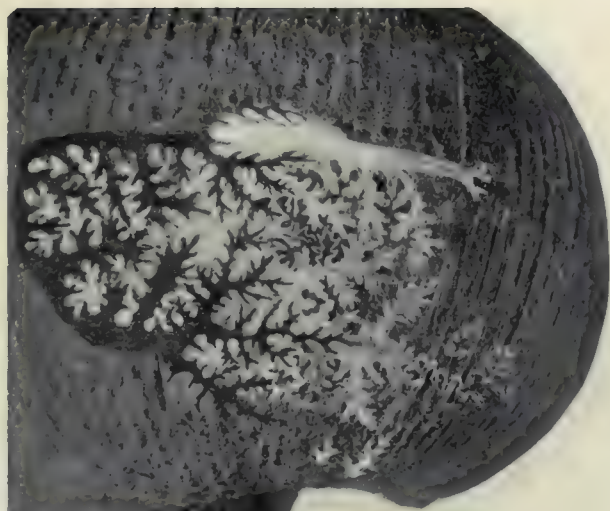
Fig. 1.

Fig. 3

Fig. 4
x 2.5

SPHÆROCERAS PEREXPANSUM, S. BUCKMAN, 1882, Holotype
Proc. Dorset N.H. & A.F.C. IV, 142; II, 4; "Sherborne, Dorset"
S. 36, 48, 98, 15; 50, 47, 87, 13; A colomorph, [max. 134];
Fig. 4; Skeleton S.L., a synthetograph

LABYRINTHOCERAS PEREXPANSUM, S. BUCKMAN SP.
Bajocian, *sauzei*; Genotype

Fig 1, $\times 2.5$ Fig. 2, $\times 2.5$

SPHÆROCERAS PEREXPANSUM, S. BUCKMAN, 1882, Holotype
Proc. Dorset N.H. & A.F.C. IV, 142; II, 4; "Sherborne, Dorset;
Inferior Oolite, probably zone of *Stephan-Humphriesianum*"
S. Buckman, ex J. Buckman, Coll. 474

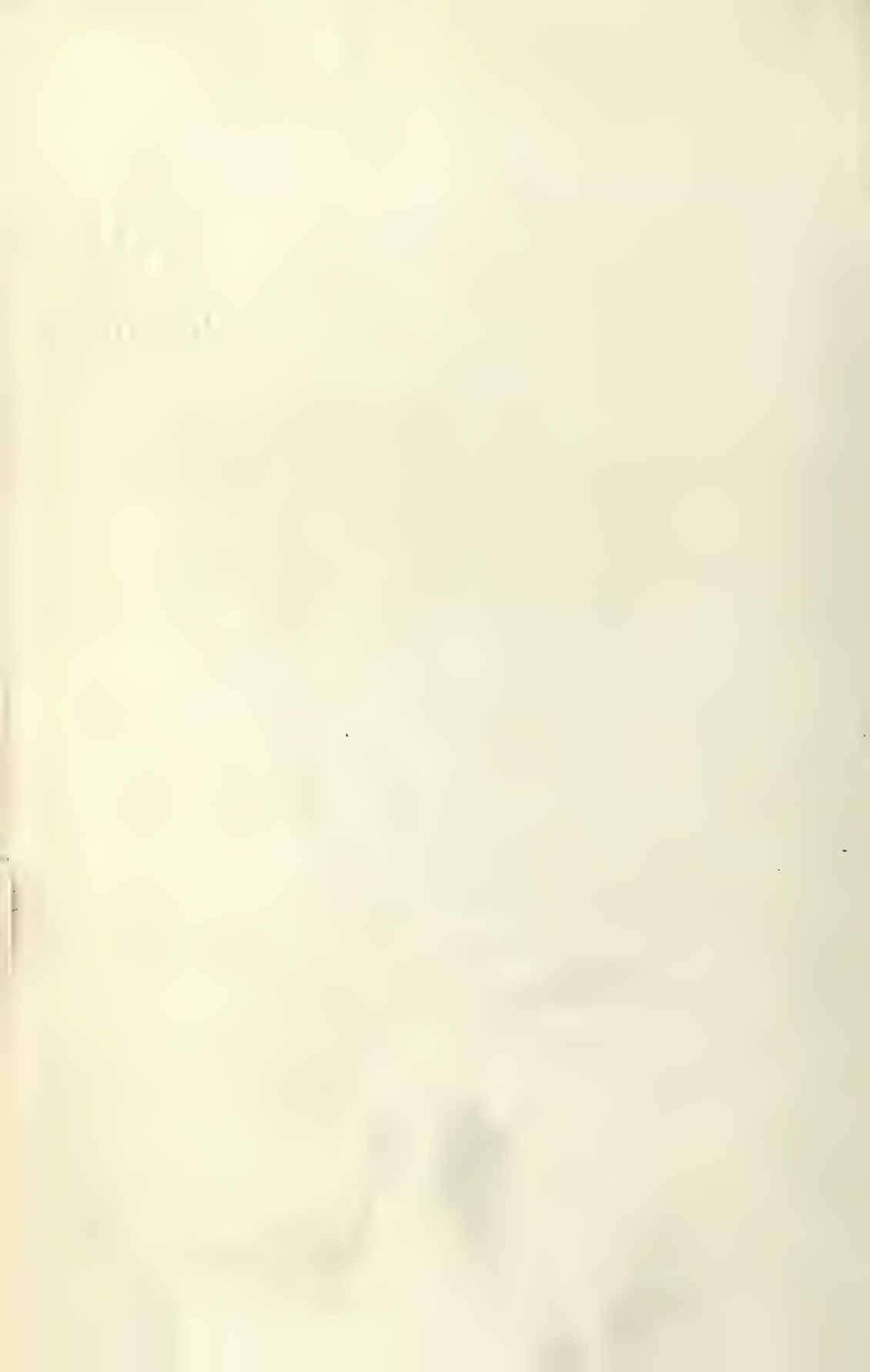
LABYRINTHOCERAS PEREXPANSUM, S. BUCKMAN SP.
Bajocian, *sauzei*; Genotype



X 0.84

SPHAEROCERAS PEREXPANSUM, S. BUCKMAN
 [Clatcombe], "near Sherborne, Dorset"
 "Inferior Oolite"; [*Humphr. z.*]; S.B., ex Darell, Coll., 1249
 S. 81, 43, 77, 21; 132, 34, 51, 34; max. 134; a contracticone

LABYRINTHOCERAS PEREXPANSUM, S. BUCKMAN SP
 Bajocian; *sauzei*





SPILEROCERAS PEREXPANSUM, S. BUCKMAN
S.B. Coll., 1249; part of right side of aperture broken away

LABYRINTHOCERAS PEREXPANSUM, S. BUCKMAN SP.
Bajocian, *sauzei*

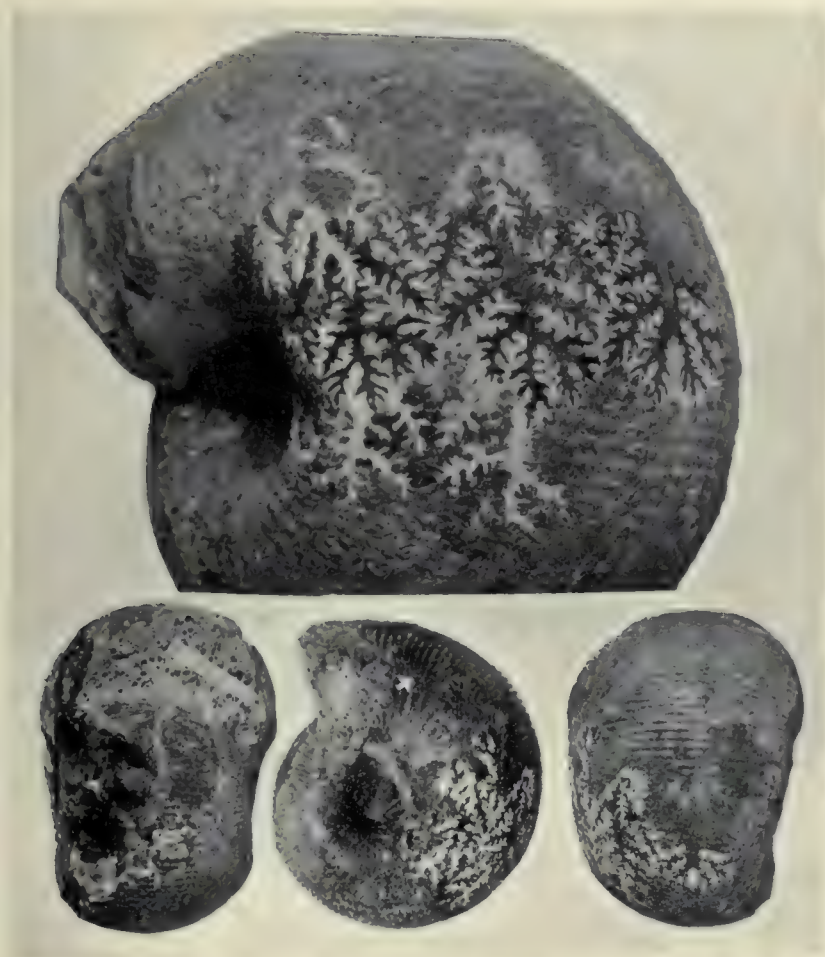
Fig. 4, $\times 2.5$ 

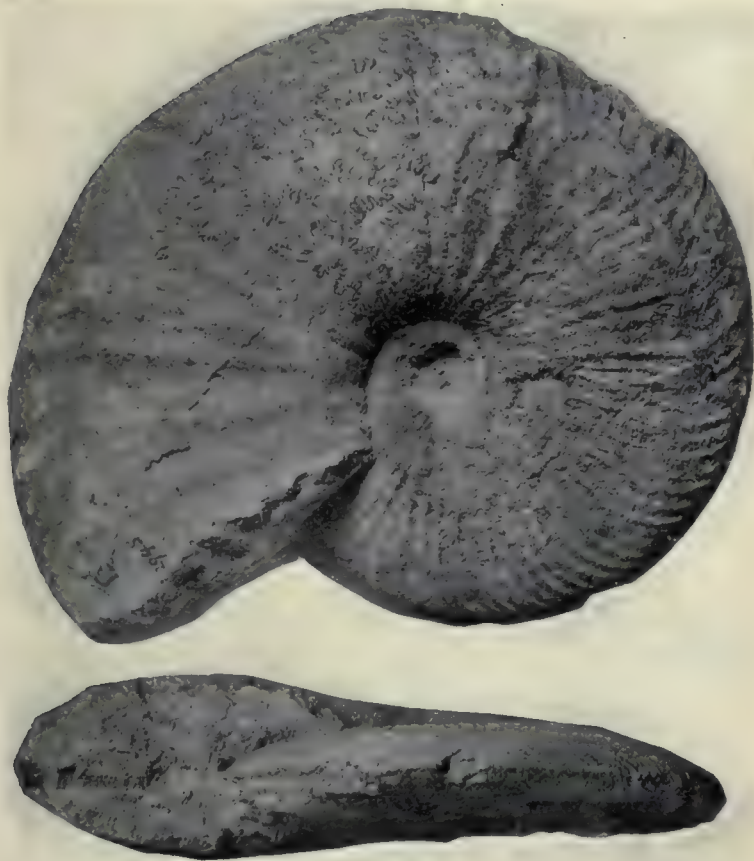
Fig. 2

Fig. 1

Fig. 3

SPHÆROCERAS PEREXPANSUM, S. BUCKMAN, 1882, Paratype
 Proc. Dorset N.H. & A.F.C. IV, 142; "Sherborne, Dorset;
 Inferior Oolite, probably zone of *Stephan. Humphriesianum*";
 S B., ex J.B., Coll. 476; S. 34, 43, 95, 20; 45, 45, 73, 19; max. c. 74.

LABYRINTHOCERAS INTRICATUM, nov.
 Bajocian, *sauzei*; Holotype

Fig. 1, $\times 0.39$ Fig. 2, $\times 0.39$

AMMONITES VICTORIS, DUMORTIER 1867
II, 136 ; XLII ; *Victoriceras*, S.B., Q.J.G.S. LXXIII, 1919, 293 ; " Radstock
Grove, Radstock, Somerset ; Lower Lias, below *ruricostatus*."
S.B. Coll. 2945 ; S. 265, 48, 29, 15 ; max. c. 315.

VICTORICERAS VICTORIS, DUMORTIER SP.
Deiran, *Radstockiceras*

Fig. 1, $\times 0.73$ Fig. 2,
 $\times 3.5$ 

AMMONITES VICTORIS, DUMORTIER 1867
 II, 136; XLII; "Kilmersdon Colliery, Radstock Grove, Radstock,
 Somerset"; S.B. Coll. 2945; Fig. 1, body-chamber, from \times ;
 Fig. 2, cross-section intercostal test with striae (grooves), $\times 3.5$

VICTORICERAS VICTORIS, DUMORTIER SP.
 Deiran, *Radstockiceras*

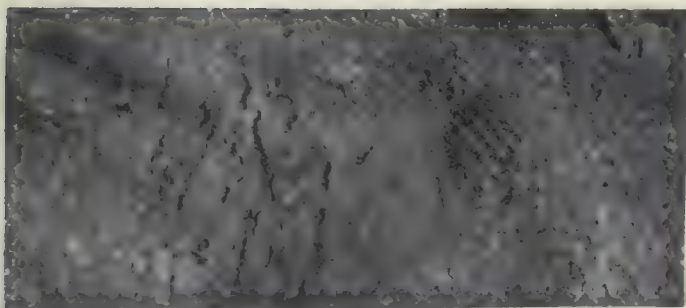
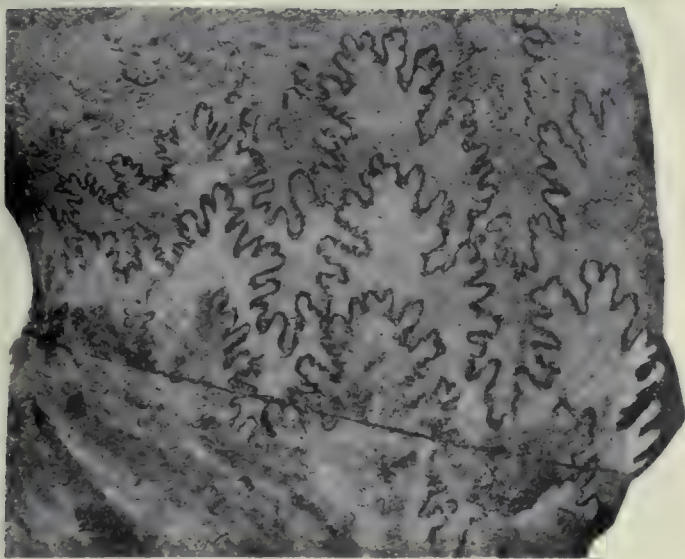
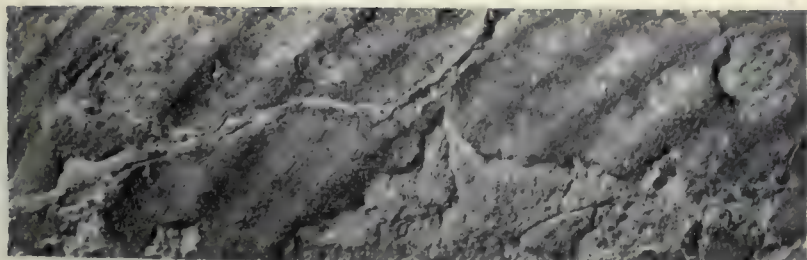
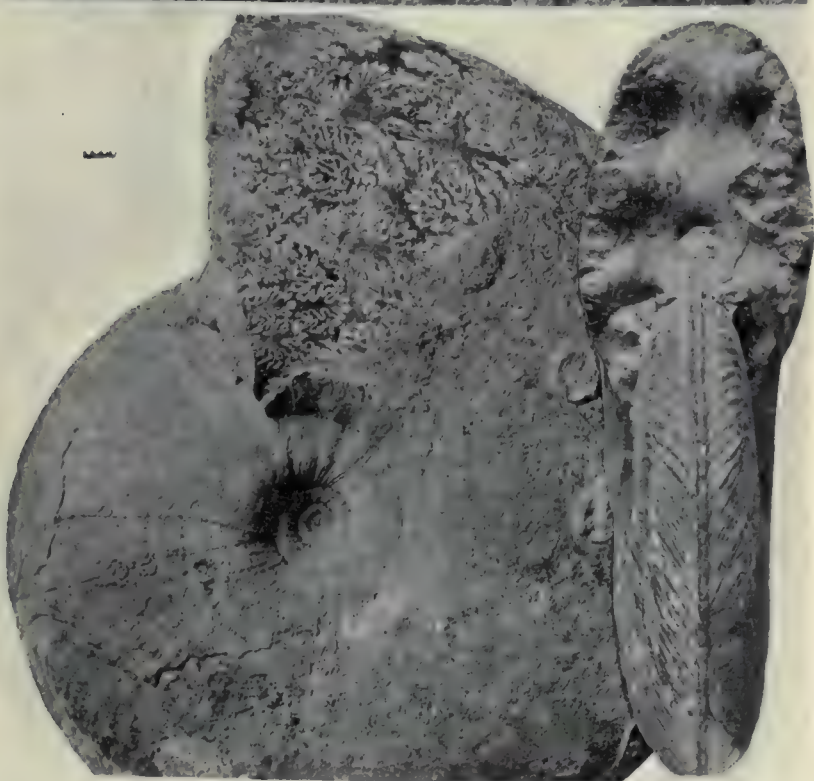
Fig. 2 $\times 3.5$ Fig. 1
 $\times 0.77$ 

Fig. 1

AMMONITES VICTORIS, DUMORTIER, 1867
 Kilmersdon Colliery, Radstock Grove, Somerset ; S. B. Coll. 2945 ;
 Fig. 2, test with striæ (grooves) and punctæ, $\times 3.5$

VICTORICERAS VICTORIS, DUMORTIER SP.
 Deiran, *Radstockiceras*

Fig. 3, $\times 3.5$ Fig. 4
 $\times 3.5$ Fig. 2
 $\times 0.53$ Fig. 1
 $\times 0.53$

AMMONITES VICTORIS, Homœomorph of
 "Radstock Grove, Radstock, Somerset; Charmouthian, *varicostatum*"
 J.W.T. Coll.; S. 220, 47, 28, 19; max. c. 320. Fig. 3, test capillate, $\times 3.5$;
 Fig. 4, sect. intercostal test with capillæ, $\times 3.5$

TUTCHERICERAS PERFOLIATUM, nov.
 Deiran, *Radstockiceras*; Genotype and Holotype

Fig. 2

Fig. 1



AMMONITES VICTORIS, Homœomorph of

Fig. 1, Suture-line and radial lines of CXXXVIIa

Fig. 2, Portion of periphery of end of whorl showing loss of carina, possibly due to injury; cf. Q.J.G.S. LXXIII, 1919, xxxi, 5

TUTCHERICERAS PERFOLIATUM, nov.

Deiran, *Radstockiceras*



ARGONAUTA SERPENTINUS, REINECKE 1818, Holotype
Maris prot. 89; XIII, 74, 75; Copy of Protograph, $\times 0.96$;
"Reperitur in marmore solidore [Up. Lias] prope Doeringstadt "
F. 89, 28, 16.5, 47. C. Thompson, Natural. 1909, XIII, [1]

HILDOCERAS SERPENTINUM, REINECKE SP.
Whitbian, *falciferum*





HILDOCERAS SERPENTINUM, REINECKE SP. ; Plesiotype, $\times 0.56$
S. Buckm. Geol. Mag. (3) VI, 1889, 201 ; C. Thompson, Natural. 1909,
XIII, [2], 214 ; " South Petherton, Somerset ; Up. Lias " ; Manchester
Mus., ex S.B. Coll., L. 11305 ; S. 127, 25, 17, 52.5

HILDOCERAS SERPENTINUM, REINECKE SP.
Whitbian, *falciferum*

x 0.9



AMMONITES BIPLEX, Homœomorph of
Cf. *Perisph.* sp., Siemiradzki, 1899, 256; [Shotover], "near Oxford"
Kimmeridge Clay [= Ampthill Clay]; J. W. Tutchter Coll.
S. 90, 32, 30, 41; 146, 32 (30), 28 (26), 48

DICHOTOMOCERAS DICHOTOMUM, S. BUCKMAN, 1919
Prionodoceratan, *dichotomum*; Genotype, Holotype
[Oct. 1927]

Fig. 2

Fig. 1



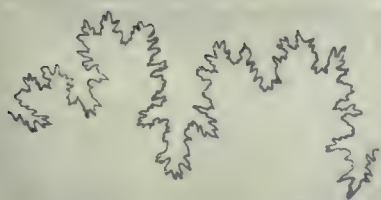
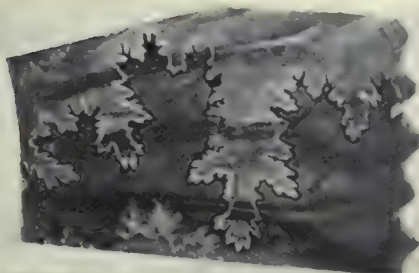
x 0.9

AMMONITES BIPLEX, Homœomorph of
Fig. 1, Left side of CXXXIXA, with much test, showing stout ribs
bordering constrictions; body-chamber from x complete?

Fig. 2, Peripheral view, ribs strong

DICHOTOMOCERAS DICHOTOMUM, S. BUCKMAN, 1919
Prionodoceratan, *dichotomum*; Genotype, Holotype

[Oct. 1927]

Fig 4, $\times 1.5$ Fig. 3, $\times 2$ Fig. 1, $\times 2$ Fig. 2, $\times 2$

AMMONITES BIPLEX, Homœomorph of

Fig. 1, Inner whorls of CXXXIXB, fine prorsicostæ and constrictions
 Fig. 2, Periphery, 2 ribs not divided; Figs. 3, 4, suture-line, nahtlobe short

DICHOTOMOCERAS DICHOTOMUM, S. BUCKMAN, 1919
 Prionodoceratan, *dichotomum*; Genotype, Holotype

[Oct. 1927]



× 0.7

AMMONITES BIFLEX, Homœomorph of
“[S.E.] England”; [Boulder Clay, ex Ampthill Clay?]
Yale Univ. Mus. (U.S.A.) Coll., 1868; S. 97, 29, 26, 44;
S. 150, 31, 25, 47; 173, 30, 25, 48

DICHOTOMOCERAS DICHOTOMUM, S. BUCKMAN, 1919
Prionodoceratan, *dichotomum*; Paratype
[Oct. 1927]

Fig. 1, $\times 0.7$ 

Fig. 2, N.S.

AMMONITES BIPLEX, Homœomorph of
Yale Univ. Mus. Coll., No. 1868. Fig. 1, Peripheral view;
Ribs show attrition.—Fig. 2, Inner whorls and suture-line

DICHOTOMOCERAS DICHOTOMUM, S. BUCKMAN, 1919
Prionodoceratan, *dichotomum*; Paratype

[Oct. 1927]

Fig. 2

Fig. 1

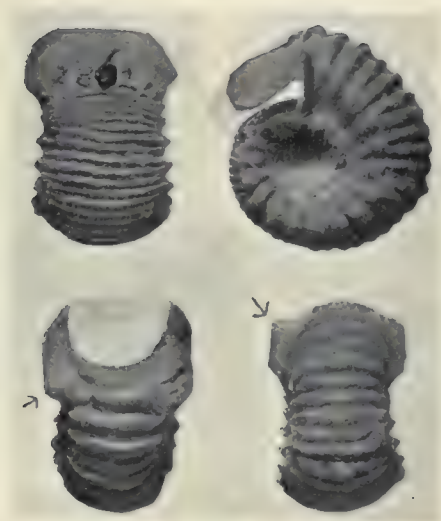


Fig. 3

Fig. 4

A Docidoceratan phaulomorph $\times 1.25$

"Bradford Abbas, Dorset, Foss. Bed [up. part] ; Inf. Oolite ;" S. B. Coll. 2862 ; S. 14, 31, 101 (89), 41 ; 23.5 ; 37, 46, 38.

→ Node on auricle. A contracticone.

TRILOBITICERAS TRILOBITOIDES, nov.
Bajocian, *discites* ; Genotype, Holotype



Fig. 3



Fig. 1

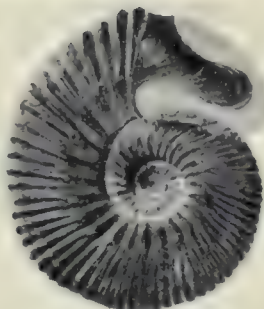


Fig. 2



"SPHÆROCERAS CONTRACTUM, J. DE C. SOWERBY SP.
" [Sandford Lane (Foss. Bed, Middle part)], near Sherborne, Dorset "
" Inferior Oolite ; " S. B., ex Darell, Coll. 1284
S. 24, 39, 63, 23 ; 41, 36, 46, 30. See LXXXI

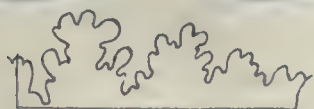
OTOITES DELICATUS, nov.
Bajocian, *Witchellia* ; Holotype

Fig. 1 $\times 1.5$

Fig. 2

Fig. 3
 $\times 2$

Fig. 4

Fig. 5 $\times 4$

AMMONITES FERRUGINEUS, SIMPSON 1855, Holotype
Pp. 78, 79; *Amauroceras*, S. B., Y.T.A., II, vii; "near Whitby, Yorkshire;
Ironstone Beds of Middle Lias"; Whitby Mus. No. 482;
S. 18, 47, 26, 22; See XX and Homœomorph LV

AMAUROCERAS FERRUGINEUM, SIMPSON SP.
Domerian, *c. lævis*

Fig. 1

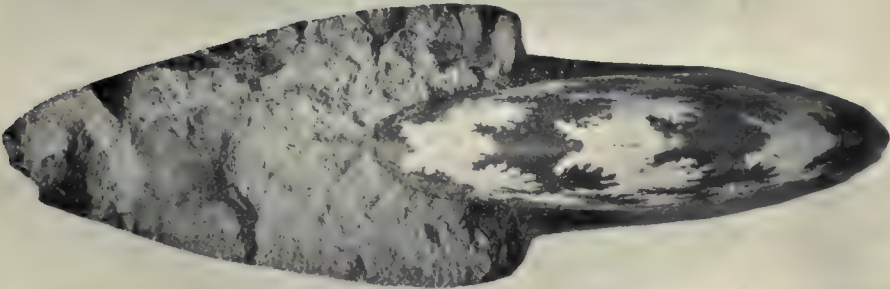
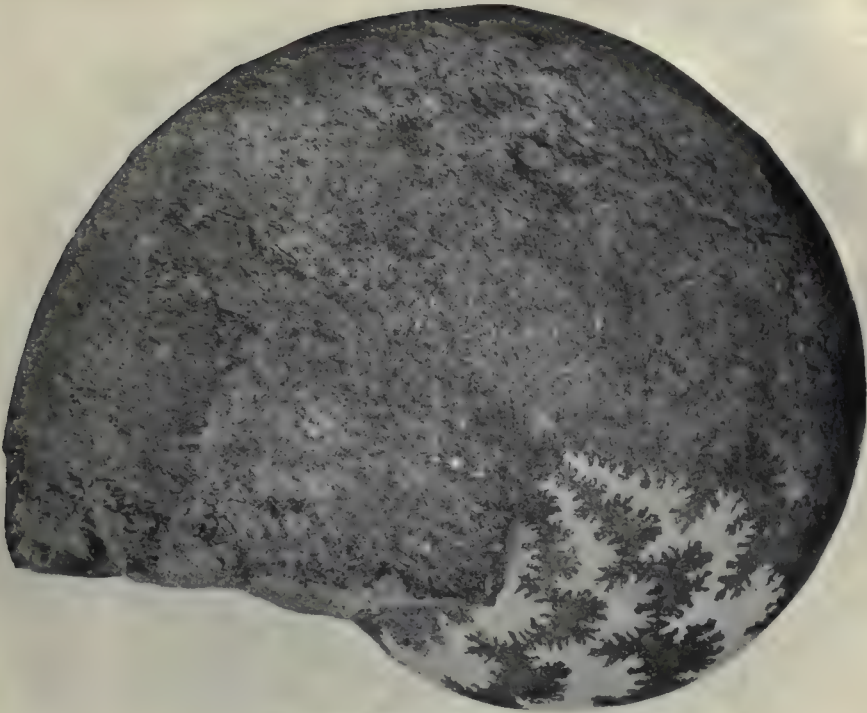


Fig. 2

AMMONITES OXYNOTUS, QUENSTEDT 1843

Flözb. Würt. 161; 1846, Ceph. v, 11; Stonehouse, Gloucestershire;
Lower Lias; J.W.T. Coll.; S. 63, 53, 19, 15. See VIII

OXYNOTICERAS OXYNOTUM, QUENSTEDT, SP.
Deiran, *oxynotum*

Fig. 1 $\times 0.73$ Fig. 2 $\times 0.73$

Cf. *PHYLOCERAS BUVIGNERI*; WRIGHT, 1883

Mon. Lias Amm. LXXVI, 1—3; "Rockhill, Radstock, Somerset;
Ravicost.-armatus"; J.W.T. Coll.; S. 162, 60, 32, 3; max. l.c. 240+.

In fig. 2 whorl-section as at radius

FASTIGICERAS CLAUSUM, nov.

Deiran, *Radstockiceras*; Genotype, Holotype

Fig. 1

Fig. 2



AMMONITES REVERSUS (SIMPSON MS.) LECKENBY 1859, Holotype
Q.J.G.S. xv, 7, 9, 15; 1, 2; The Castle Rock, Scarborough, Yorkshire;
Kelloway Rock " (brown ool. calc. with irony sand); Sedgwick Mus.,
Cambridge (Leck. Coll.); S. 53, 28, 30, 43. Cf. XCIX

RURSICERAS REVERSUM, SIMPSON-LECKENBY SP.
Callovian, *athleta*; Genotype



Fig. 1

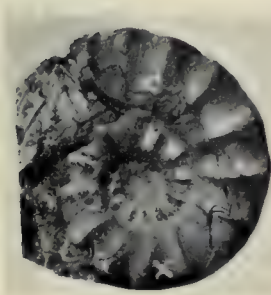
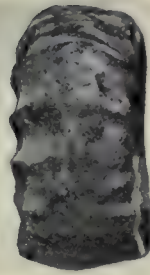


Fig. 2



AMMONITES PLANICOSTATUS; J. BUCKMAN, 1844
Geol. Chelt., New Ed. p. 90 pars; "L[ias] M[arlstone], Glenfall";
"Cheltenham, Lias" label; Ochraceous Lias; S.B., ex J. B., Coll.
No. 2750; S. 20.5, 36, 63(59), 36; 28.5, 39, 42(40), 41. See CXLVI

BEANICERAS CRASSUM, nom. nov. $\times 1.25$
Hwiccian, *Beaniceras*

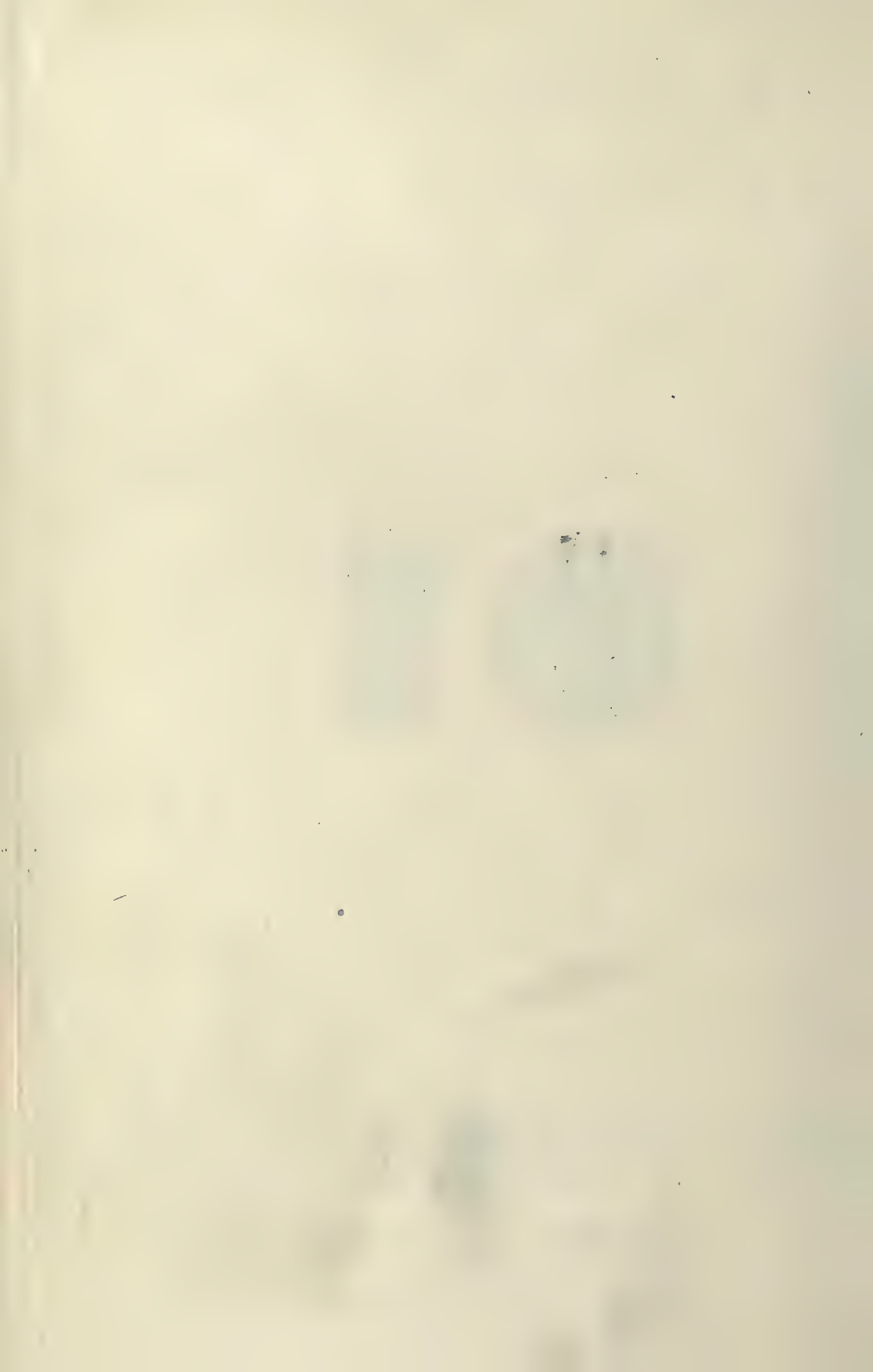


Fig. 1

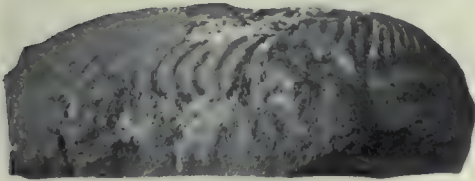
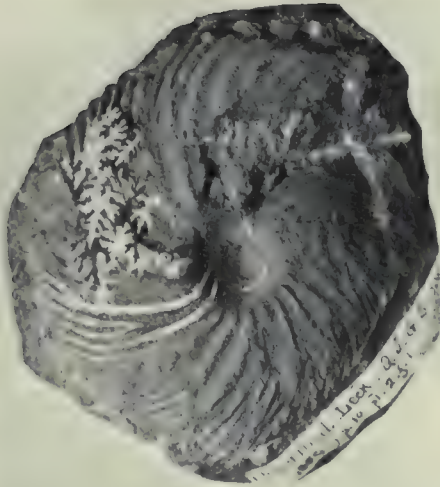


Fig. 2

AMMONITES PLACENTA, SIMPSON-LECKENBY 1859, Holotype
Q.J.G.S. XV, 10; II, 1; "The Castle Rock, Scarborough, Yorks;
"Kelloway Rock"; Grey, coarse ool.; Sedgwick Mus., Cambridge
(Leckenby Coll.); S. 58, 52, 34? 19. See CXXIA

LONGÆVICERAS PLACENTA, SIMPSON-LECKENBY SP.
Callovian, *duncani*



AMMONITES LAMELLOSUS, D'ORBIGNY 1844

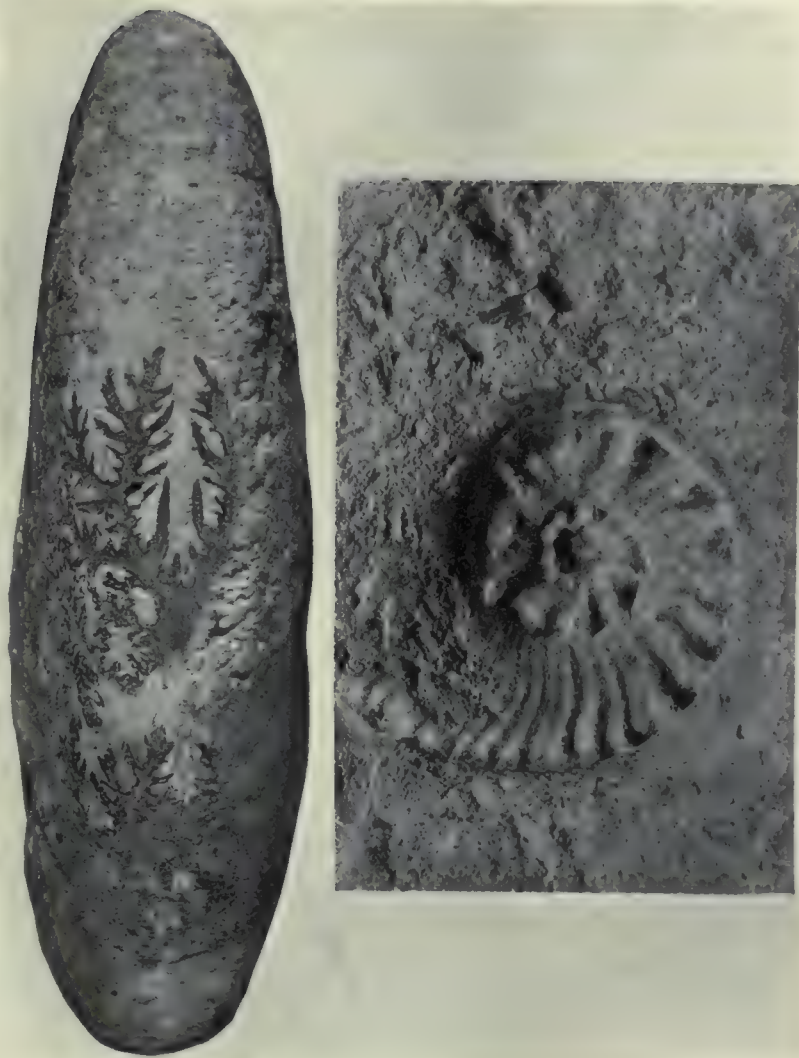
T.J. Céph. 283; LXXXIV, 1, 2; Kilmersdon Colliery, Radstock Grove,
Radstock, Somerset; *armatum* zone; S.B. Coll. 2917;
S. 256, 55, 28, 18; max. c. 428. See XXXIII

PHRICODOCERAS LAMELLOSUM, D'ORBIGNY SP.

Wessexian, *Phricodoceras*

Fig. 1

Fig. 2



AMMONITES LAMELLOSUS, D'ORBIGNY

S.B. Coll. 2917 ; Fig. 1, Periphery $\times 0.55$; Fig. 2, Umbilicus, Nat. size

PHRICODOCERAS LAMELLOSUM, D'ORBIGNY SP.
Wessexian, *Phricodoceras*



AMMONITES LAMELLOSUS, D'ORBIGNY
S.B. Coll. 2917; Suture-line $\times 0.85$

PHRICODOCERAS LAMELLOSUM, D'ORBIGNY SP.
Wessexian, *Phricodoceras*

Fig. 3

Fig. 1

Fig. 2



x 0.9

AMMONITES LAMELLOSUS, D'ORBIGNY

"Rockhill, Clandown, Radstock, Somerset; Charmouthian; *armatus*;"
J.W.T. Coll.; S. 113, 52, 38, 22, portion shown; with additional
part of whorl (not figured), S. 158, 55, 32, 18

PHRICODOCERAS LAMELLOSUM, D'ORBIGNY SP.

Wessexian, *Phricodoceras*

Fig. 2

Fig. 3

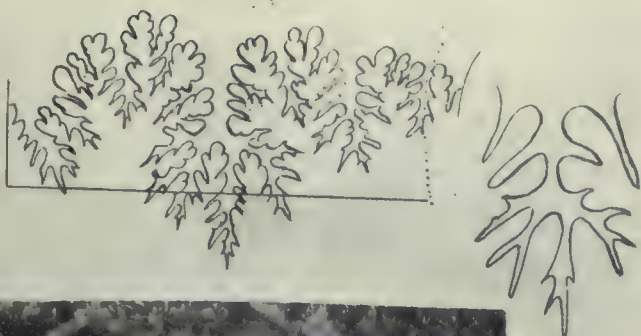


Fig. 1

A mammillate SONNINIA

[Sandford Lane], Sherborne, Dorset; Inf. Oolite, [Top of Fossil Bed],
Q.J.G.S. XLIX, 1893, p. 492; Fig. 2, L¹ O; Fig. 3, Skeleton L¹

PAPILLICERAS PAPILLATUM, nov.
Bajocian, *sauzei*. Genotype, Holotype

Fig. 1

X

Fig. 2



x 0.6

A mammillate SONNINIA

Fig. 2. Hollow keel, constricted by lateral grooving, strong at A : a mere ridge of keel at B ; S.B., ex J.B. Coll. 1181 ; S. 202, 33, 28 (24), 40 ; max. c. 250. X, last s.l.

PAPILLICERAS PAPILLATUM, nov.
Bajocian, *sauzei*, Genotype, Holotype

Fig. 1

Fig. 4.



Fig. 2

Fig. 3

STEPHANOCERAS BRAIKENRIDGII; S. BUCKMAN
 1881, Q.J.G.S. XXXVII, 596; "Frogden Quarry, Osborne, Dorset;
 "Inf. Ool. Humph. zone"; Auricles incompletely grown?
 S.B. Coll. 2860; S. 42, 33, 59, 38; 73, 30.5, 41, 42

EPALXITES FORMOSUS, nov.
 Bajocian, *blagdeni* [*Stemmatoceras*]; Holotype

Fig. 1

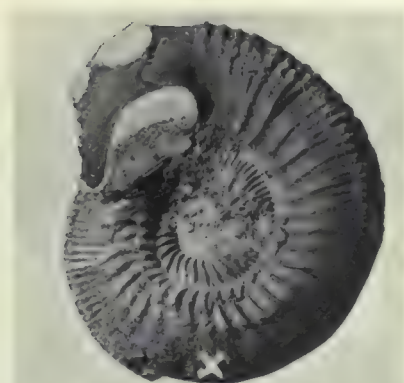


Fig. 3



Fig. 2

Fig. 4 \times c. 2

STEPHANOCERAS BRAIKENRIDGII; S. BUCKMAN
 1881, Q.J.G.S., XXXVII, 595; "[Clatcombe], Sherborne, Dorset;
 "Inf. Ool., *Humphriesianum* zone"; S.B., ex J.B., Coll. 2863
 S. 35, 36, 49, 27; 50, 31, 35, 40

MASCKEITES DENSUS, nov.
 Bajocian post-sauzei [*Masckeites*]; Genotype, Holotype

Fig. 3

Fig. 1



Fig. 1a

Fig. 2

STEPHANOCERAS ZIGZAG ; S. BUCKMAN
 1889, Q.J.G.S., XLVIII, 448, " with aperture " ; " Crewkerne Station,
 Somerset " ; " Top of Inf. Ool." S.B., ex Darell, Coll. 828.
 S. 34, 30, 41, 44 ; 56, 29, 30, 44. Fig. 1a, Details emphasized.

PROCERITES EURYODOS SCHMIDT SP. 1846
 Vesulian, *zigzag*

Fig. 2

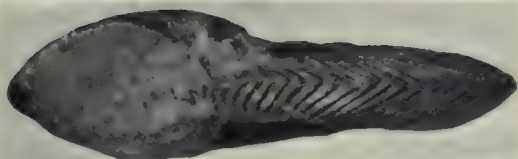


Fig. 1

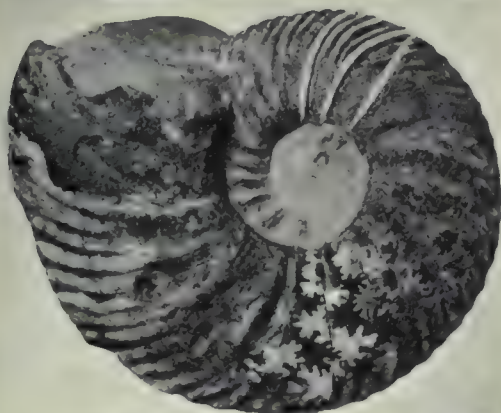
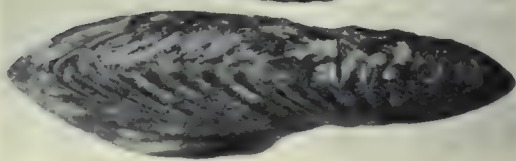


Fig. 3



AMMONITES LAMBERTI. J. SOWERBY, 1819; Topotype
M.C. III, 73; CCXLII, 3; "Weymouth, Dorset; Oxford Clay" [calcareous
band]; J.W.T. Coll.; S. 69, 43.5, 27, 28.5

LAMBERTICERAS LAMBERTI, J. SOWERBY SP.
Divesian, *lamberti*; Genoholotype

Fig. 1

Fig. 2



x 0.89

AMMONITES SERRATUS; AUCTT.

St. Ives, Huntingdonshire; Drift, ex Kimmeridge Clay. J.W.T. Coll.

S. 124 43.5, 32, 22.5; max. c. 190

PRIONOCERAS PRIONODES. nov.

Kimmeridgian, *serratum*; Genotype, Holotype

Fig. 4, $\times 1.5$

Fig. 1

Fig. 5



Fig. 2

Fig. 3

"CARDIOCERAS GOLIATHUS"

"St. Ives, Huntingdonshire; Corallian," [ferruginous grit, L.C.G.,
J.W.T. Coll.; S. 41, 48, 58 (61), 15; 81, 47, 71, 17. See CXXXII

GOLIATHICERAS GALEATUM, nov.
Argovian, *vertebrale* [*Goliathiceras*]; Holotype

Fig. 1

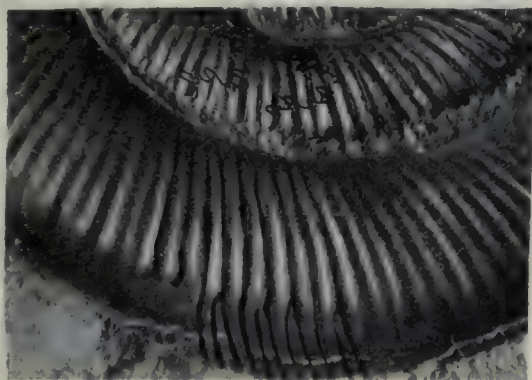


Fig. 2, x 2

AMMONITES TENUICOSTATUS, YOUNG & BIRD 1822; Topotype
 Geol. Yorksh. 247; XII, 8; [Whitby, Yorkshire; Upper Lias, Grey Shales]
 Alice, Lady Fowler Coll.; S. 71, 24, 20? 57; See XXXI

DACTYLIOCERAS TENUICOSTATUM YOUNG & BIRD SP.
 Whitbian, *tenuicostatum*

Fig. 3



Fig. 2



Fig. 4

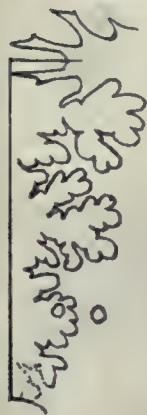
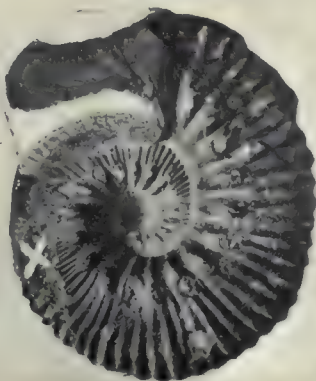


Fig. 1



AMMONITES SAUZEI; J. BUCKMAN, 1881
 Q.J.G.S., XXXVII, 62; *Sphaeroceras*, S. B., Id., 596; [Sandford Lane,
 (Foss. Bed, top)], "near Sherborne, Dorset, Inf. Ool."
 S. B., ex J. B., Coll. 2861; S. 30, 41, 78, 18; 51, 41, 49, 28. See CXLI

OTOITES CONTRACTUS, J. DE C. SOWERBY SP. 1825
 Bajocian, *sauzei*



Fig. 3



Fig. 1



Fig. 2

AMMONITES BRAIKENRIDGII; J. BUCKMAN, 1881, Plesiotype
 Q.J.G.S. XXXVII, 62, fig. 3; *Stephanoceras*, S. B., Id., 595;
 Clatcombe, near Sherborne, Dorset; Inf. Ool. "[Humphr. z." S.B.]
 Manchester Mus. (S. B. Coll.) L. III41; S. 54, 31.5, 41, 39. See CLI

EPALXITES LATANSATUS, nov.
 Bajocian, *blagdeni* [*Stemmatoceras*]; Holotype

Fig. 1

Fig. 3
N.S.

Fig. 2

x 0.8

PERISPHINCTES DAVIDSONI

[Frogden Quarry], "Oborne, Dorset; I. O." [Roadstone (up. part);
S.B., ex Darell, Coll. 884; S. 101, 32, 21, 44; 68 ribs;
Max. c. 160

LEPTOSPHINCTES LEPTUS, nov.

Bajocian, *niortensis*; Genotype, Holotype

Fig. 1



Fig. 3

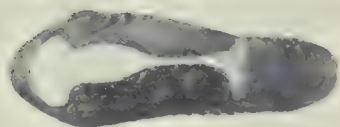
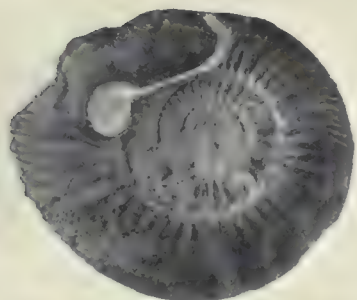


Fig. 2



AMMONITES MARTINSII

[Frogden Quarry, Osborne], "near Sherborne, Dorset; I.O.";
S.B., ex Darell, Coll. 868; S. 44, 31, 3, 47; 42 ribs.

Fig. 1, Lower half of lappet restored; Fig. 2, lappet complete

LEPTOSPHINCTES CLEISTUS, nov.

Bajocian, *niortensis*; Holotype

Fig. 3
N.S.

Fig. 1

Fig. 2



x 0.8

PERISPINCTES MARTINSII; S. Buckman, 1881
Q.J.G.S., XXXVII, 602; "Half-way House, Sherborne, Dorset;
Parkinsoni zone" [Foss. Bed]; S.B. Coll. 3157;
S. 91, 27.5, 26.5, 51; 62 ribs; max. c. 150.

VERMISPINCTES VERMIFORMIS, nov.
Vesulian (Eningenian); *truellii*; Genotype; Holotype



PARKINSONIA CAUMONTII, ally of, S. Buckman
1893, Q.J.G.S. XLIX, 497; "Lower Clatcombe (§ XIII, 7), Sherborne,
Dorset; *Niortensis* ?." Mouth restored from other side; S. B. Coll., 3274;
S. 67, 26, 20, 51; 68 ribs; tuberculate nearly to body-chamber.

CAUMONTISPHINCTES POLYGYRALIS, nov.
Bajocian, *niortensis*; Genotype, Holotype

Fig. 2

Fig. 1



x 0.69

EMILEIA, cadicone stage

E. crater, S.B., 1913, Y.T.A., II, ix; [Sandford Lane, Foss Bd. Low. pt.]
 "Near Sherborne, Dorset"; Manchester Mus. (S.B., ex Darell, Coll.)

L. 11270; S. 103, 36, 74, 34; 124, 36, 67, 34; 163, 34, 47, 40

EMILEIA CRATER, S. BUCKMAN

Bajocian, *Shirburnia*; Holotype. Cf. CXXXIII

Fig. 1
× 2

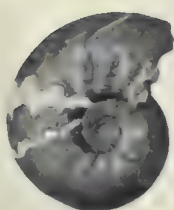
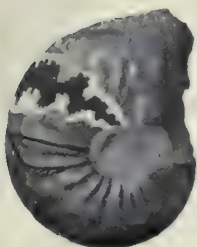


Fig. 2
× 1.5



AMMONITES BUCKII, SIMPSON 1843, Holotype
Pp. 42, 43, (Fig. 1), [Yorkshire]; "Lower Lias"; "R. H. Bay" (1855, 85)
"L.L. 14" (1884, xxi) "Ind. b. 15" (Id. 121). Whitby Mus. 479[a]
S. 13.5, 43, 27, 27. Fig. 2. "Var. a" ? (1855, 85), 479[b]; S. 20, 50, 21, 21

OXYNOTICERAS BUCKII, SIMPSON SP.
Deiran, *polyophyllum*. See CXLIII

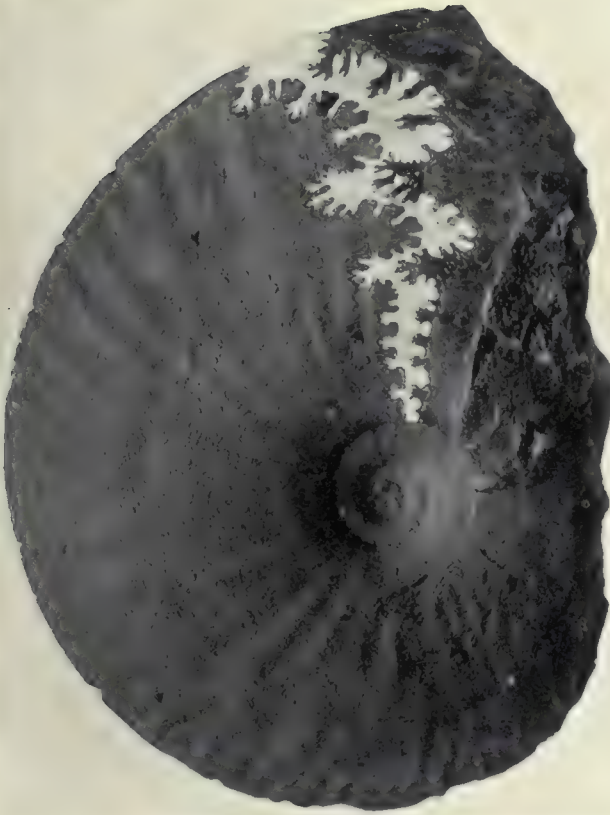


Fig. 1



Fig. 2

"OXYNOTICERAS OXYNOTUM

"Vale of Gloucester; Lower Lias, *oxynotum* zone"

A. Vaughan Coll.; ϕ . 108, 52, 16.5, 15; max. c. 170+. See CXLIII.

OXYNOTICERAS BUCKII, SIMPSON SP.
Deiran, *polyophyllum*



Fig. 1

Fig. 2



× 1.5

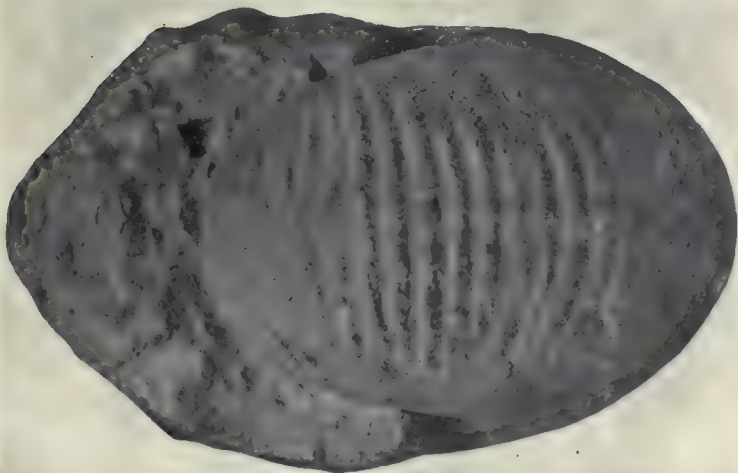
AMMONITES RETENTUS, SIMPSON 1855, Holotype
P. 84; 1884, pp. 120, 121; R[obin] H[oods] Bay; Lower Lias;
Mus. Geol. Surv. Engl. (Clarkson Coll.), No. 26401;
S. 23, 54, 21, 10. Cf. CXLIV

RETENTICERAS RETENTUM, SIMPSON SP.
Deiran, *simpsoni*; Genotype

Fig. 1



Fig. 2



MACROCEPHALITES MORRISI; S. BUCKMAN, 1893
 Proc. Dorset N.H. & A.F.C. XIV, 43; 1895, Q.J.G.S., LI, 440 (pars);
 "Near Sherborne, Dorset" [Milborne Wick, Som.]; Fullers' Earth Rock
 [Milborne Beds]; S.B., ex J.B., Coll. 1923; S. 99, 51, 66, 10

MORRISICERAS SPHÆRA, nov.
 Bathian (Falaisian), *morrissi*; Genotype, Holotype



Fig. 1

Fig. 2

WITCHELLIA LÆVIUSCULA; S. BUCKMAN, 1889, Plesiotype
Q.J.G.S., XLV, 658; XXII, 11; Frogden Quarry, Osborne, Dorset
Green-grained marl (Id. 1893, XLIX, 500, § XI, 9); Manchester M.
(S.B. Coll.) L. 11439; S. 85, 48, 25, 21. Septicarina lost. Umb. spinous

WITCHELLIA SPINIFERA, nov.
Bajocian, *Witchellia*; Genoelectotype; Holotype



PARKINSONIA CAUMONTII

[Lower Clatcombe, (§ XIII, 7)] "near Sherborne, Dorset"

S. B. Coll. (purch.) 3276; S. 24, 29, 25, 46

Lateral auricle broken at end. Tubercles persistent

CAUMONTISPHINCTES PHAULUS, nov.

Bajocian, *niortensis*; Holotype

Fig. 4

Fig. 1



Fig. 3

Fig. 2

QUENSTEDTICERAS PAVLOWI, R. DOUVILLÉ
 1912, *Cardioc.*, 74, 75; XI, 13; *Pavloviceras*, T.A., III, 18
 "St. Ives, Hunts; Oxford Clay"; J.W.T. Coll.
 S. 35, 40? 74, 23?; 55, 43, 82, 25

PAVLOVICERAS PAVLOWI, R. DOUVILLÉ SP.
 Divesian, *vertumnus*; Genotype

Fig. 1 $\times 0.91$ Fig. 2 $\times 0.86$

"AMMONITES ORDINARIUS, BEAN," Chirotype
 "Kell. Rock, Scarbro" (Bean's lab.) ; Leckenby, 1859, Q.J.G.S., XIV, 9
 (*A. lamberti pinguis*, Qu. 1887, xc, 15a) ; Sedg. M. Cambr. (Leck. Coll.)
 S. 66, 47, 54, 19.5 ; 94, 50, 59, 19 ; max. c. 200. See CXVIII A

EBORACICERAS ORDINARIUM, BEAN-LECKENBY SP. 1859
 Divesian, *vertumnus* ; Holotype

Fig. 1

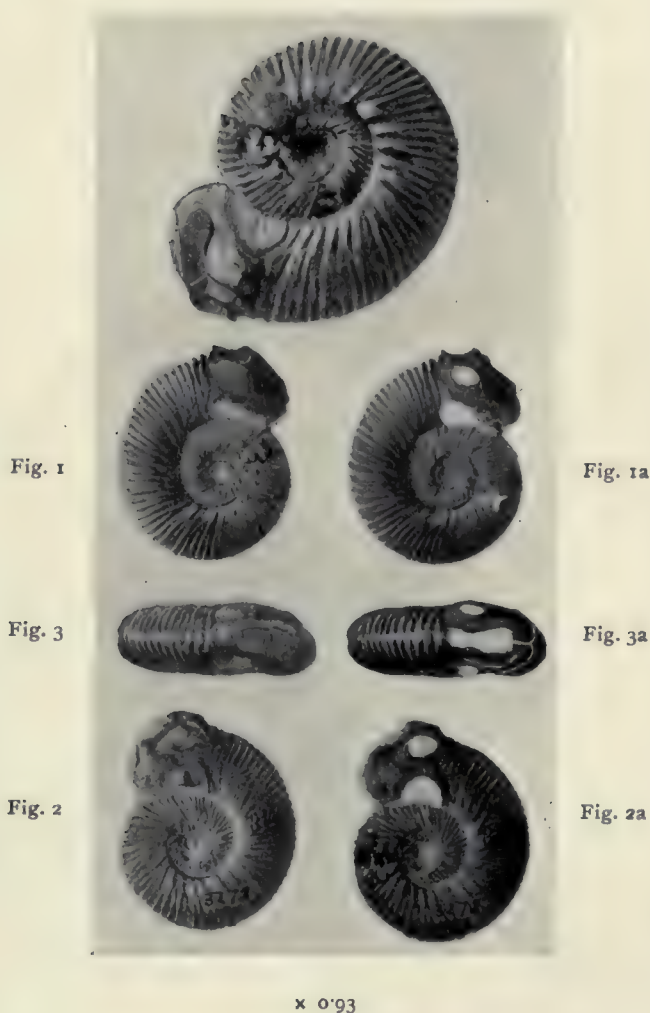


Fig. 2

"AMMONITES ORDINARIUS" (Bean) Leckenby 1859 (Paratype ?)
Q. J.G.S., XIV, 9; Gristhorpe Bay, Yorks; Kell. R.; blue argill.
(*A. lamberti pinguis*, Qu. 1887, xc, 15); Sedg. M. Cambr. (Leck. Coll.)
S. 50, 46, 46, 22; 66, 45, 51, 21; 15 ribs; max. c. 95. See CLXXI.

EBORACICERAS SUBORDINARIUM, nov.
Divesian, *lamberti*; Holotype

Fig. 1b x 1·3



"*MORPHOCERAS PSEUDO-ANCEPS*"

Broad Windsor, Dorset ; Inf. Ool. (top beds)

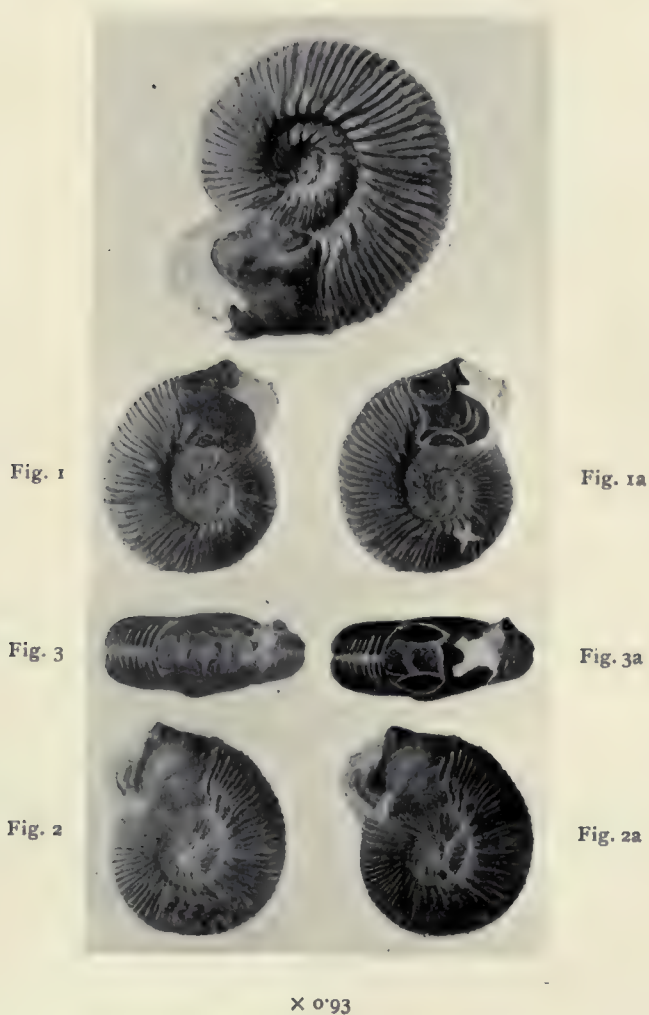
S.B. Coll. 3272 ; S. 29, 33, 28.5, 40

Mouth with ocular and brachial apertures open

EBRAYICERAS OCELLATUM, nov.

Vesulian (Eningenian), zigzag ; Genotype, Holotype

Fig. 1b x 1.3



"*MORPHOCERAS PSEUDO-ANCEPS*"

"Crewkerne Station, Somerset ; Inf. Oolite" (top beds)

S.B., ex Darell, Coll. 3235 ; S. 29, 38, 33, 34.5

Mouth re-opened in front and side-apertures sealed

EBRAYICERAS PSEUDO-ANCEPS, EBRAY SP. 1864

Vesulian (Eningenian), *zigzag*. See CLXXIII

Fig. 1



× 1.3

Fig. 2



× c.4

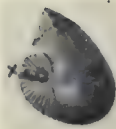
Fig. 3



OECOPTYCHIUS (sphaerocone stage)
 Burton Bradstock, Dorset, Inf. Ool. [*Terebratula* Bed]
 S.B., ex Darell, Coll. 1115 ; S. 8.5, 57, 76, —.

OECOPTYCHOCERAS GROSSOUVREI, BRASIL SP. 1893
 Vesulian (Eningenian), *truellei*

Fig. 1



x 1.3

Fig. 2



OECOPTYCHIUS GROSSOUVREI; S. BUCKMAN, 1898
 Q.J.G.S., LIV, 456; "Cf. *O. grossouvrei*," S.B., T.A., III, 1919, 7
 Broad Windsor, Dorset; I.O.; S.B. ex Stubbington, Coll. 382
 S. 10.75, 58, 48, —. Mainly cast. A goniocone. See CLXXV

OECOPTYCHOCERAS SUBREFRACTUM, S. BUCKMAN MS. SP.
 Vesulian (Eningenian), *truellei*; Genotype, Holotype

Fig. 1

Fig. 2

Fig. 3



× 1·3

An acmic OPPELID

Vetney Cross, Bridport, Dorset ; Inf. Ool., (Shell Bed)

S.B. Coll. 3265 ; S. 15, 40, 53 (40), 28

Intermittent large costæ bullate latero-peripherally

DIPLESIOCERAS DIPLESIUM, nov.

Vesulian (Eningenian), *garantiana* ; Genotype, Holotype

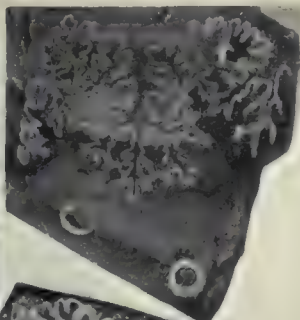
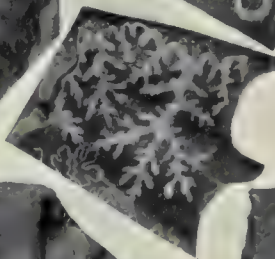
Fig. 3
x 2Fig. 4
x 2Fig. 5
x 2

Fig. 1



Fig. 2



"MICROCERAS DENSINODUM"

[Folly Lane, Cheltenham, Glos; Mid. Lias, *armatum*]

J.W.T. Coll., S. 79, 24, 19 (17), 54; max. c. 112; body-ch. c. $1\frac{1}{4}$ whorl
Orn., 1 to c. 3, 2 to c. 5, 4 to c. 8, 5 to c. 13 mm. diam.

CRUCIOBICERAS CRUCIOBATUM, nov.
Raasayan, *densinodum*; Genotype, Holotype

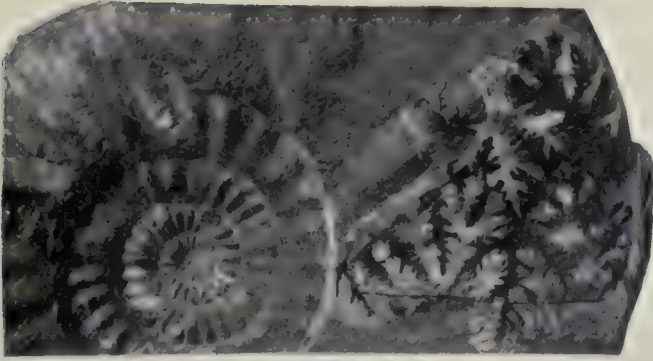


Fig. 3.
N.S.



Fig. 1
× 0.77

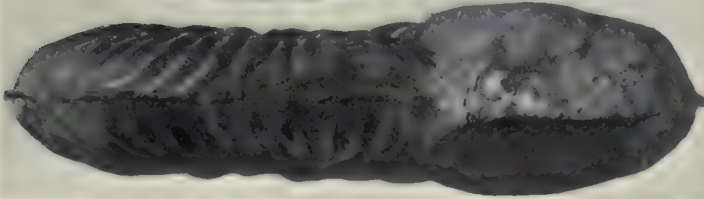


Fig. 2
× 0.82

HAMMATOCERAS SP.

Bradford Abbas, Dorset; Inf. Ool. (Foss. Bed [about middle])
S.B. Coll. 3328. S. 115, 39, 27 (24), 32; [max. 320, No. 1896]
Septicarinate. No body-chamber

EUDMETOCERAS EUDMETUM, nov.

Bajocian, *discites* [*Eudmetoceras*]; Genotype, Holotype



x0.75

HAMMATOCERAS AMPLECTENS, S. BUCKMAN 1889, Holotype
Q.J.G.S. XLV, 662; "Bradford Abbas, Dorset; Inf. Ool. *concavum* z."
(Foss. Bed, [about middle]); Manchester Mus (S.B. Coll. 482)
S. 168, 52, 27, 11.5; max. c. 260. See CLXXIX

EUDMETOCERAS AMPLECTENS, S. BUCKMAN SP.
Bajocian, *discites* [*Eudmetoceras*]

Fig. 1 $\times 0.75$ Fig. 2 $\times 0.96$ 

HAMMATOCERAS AMPECTENS, S. Buckman 1889

Fig. 1, Holotype. Fig. 2, Paratype; Loc. etc. Id.

S.B., ex J.B., Coll. 3342; S. c. 30, 43, 37, 33.5; 69, 49, 29, 16.5

S. 103, 52, 31, 12.5; 138, 48, 31, 11.5. Gerontic swelling early

EUDMETOCERAS AMPECTENS, S. BUCKMAN SP.

Bajocian, *discites* [*Eudmetoceras*]



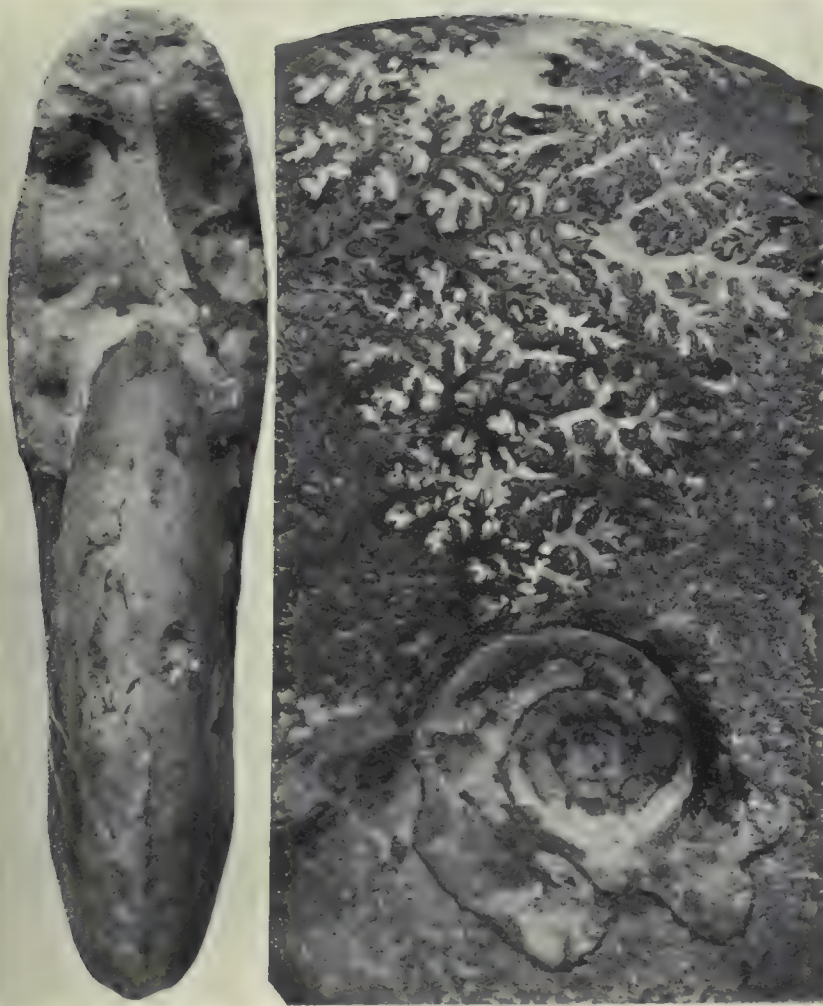
x 0.66

HARPOCERAS FISSILOBATUM; S. BUCKMAN 1881
Q.J.G.S. XXXVII, 603; *Sonninia*, Id. 1893, XLIX, 494
*Fissilobicer*as, S.B., 1919, Y.T.A. II, xv; S.B., ex J. B., Coll. 554

FISSILOBICERAS FISSILOBATUM, WAAGEN SP. 1867
Bajocian, *Shirbuirnia*; Genotype

Fig. 1 $\times 0.66$

Fig. 2



HARPOCERAS FISSILOBATUM; S. BUCKMAN 1881
 " [Sandford Lane], Sherborne, Dorset; Inferior Oolite
 [Fossil Bed (lower part)]; S. B., ex J. B., Coll. 554
 S. 202, 51, 28, 18; max. c. 420. Septicarina obsolescent

FISSIOBICERAS FISSILOBATUM, WAAGEN SP. 1867
 Bajocian, *Shirburnia*; Genotype



Fig. 2

Fig. 1



x 0.8

HAUGIA INÆQUA, S. BUCKMAN
 1898, Mon. I. O. Amm. Sup. p. xxix; "Tinsbury Sleight, Radstock,
 Somerset; Upper Lias [Ceph. Bed equiv.]" ; J. W. T. Coll.
 S. 158, 44, 20, 23; max. c. 210. Cf. XV

ESERICERAS INÆQUUM, S. BUCKMAN SP.
 Yeovilian, *eseri*; Genotype

Fig. 3



Fig. 1

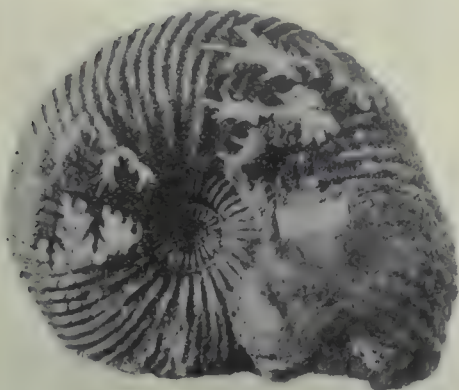


Fig. 2



"QUENSTEDTICERAS ORDINARIUM"

"Scarborough, Yorks; Kell. R." Iron-stained sand

Sedg. Mus., Cambridge; S. 53, 43'5, 45, 26'5

Size of specimen 63 mm.; max. c. 90+; 28 ribs to 53 mm.

WEISSERMELICERAS LONGILOBATUM, S. Buckman
Callovian, *athleta*; Genotype, Holotype, p. 20

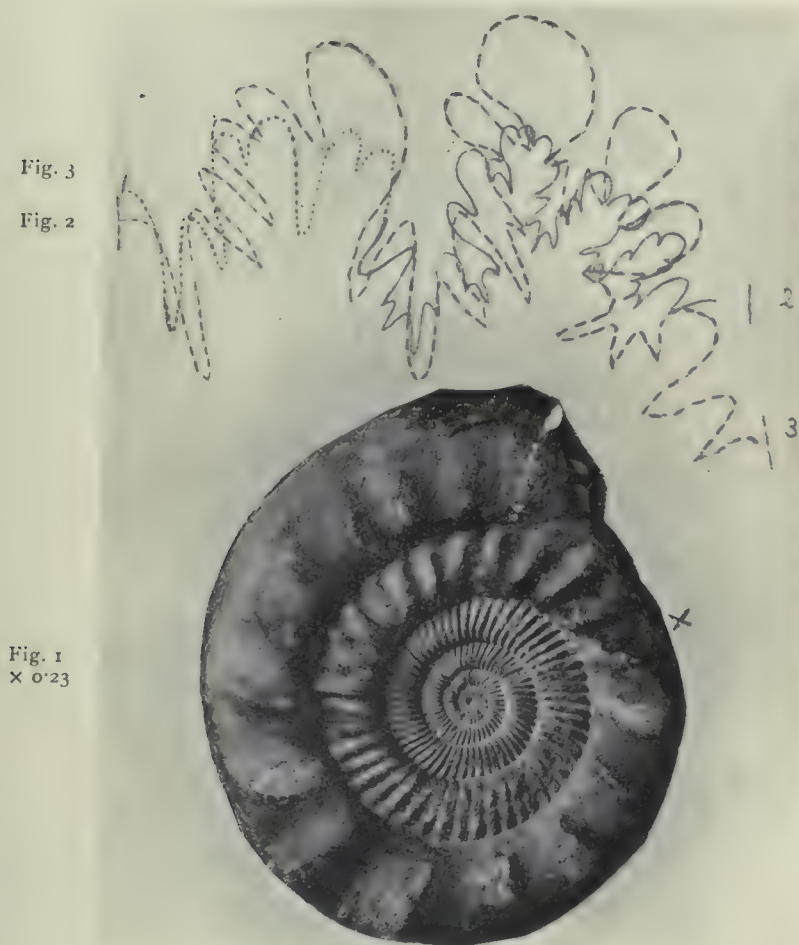


Fig. 1
x 0.23

AMMONITES INGENS, YOUNG & BIRD 1822, Holotype
P. 247; XII, 2; "Pickering [Yorks] Oolite" [white; many cream col. grs.]
Mouth complete; Whitby Mus. 1279; S. 222, 27.5, 30(22), 56
S. 264, 25, 31 (23), 55; 336, 27, 20, 54. Ribs, 56, 46, 18; [Figs. 1, 2]
[Fig. 3, S.l. *Perisph. martelli*; Siemir. p. 268]

DICHOTOMOSPHINCTES INGENS, YOUNG & BIRD SP.
Perisphinctean, *antecedens* (*ingens*). Cf. CXXXIX

[Oct. 1927]

Fig. 4



Fig. 3



Fig. 1

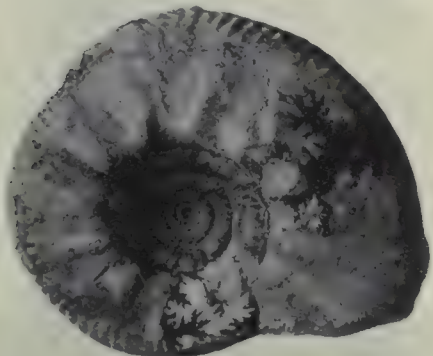
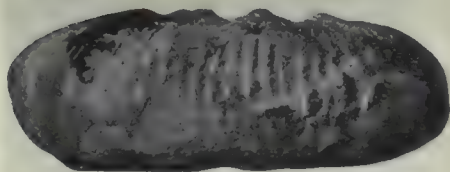


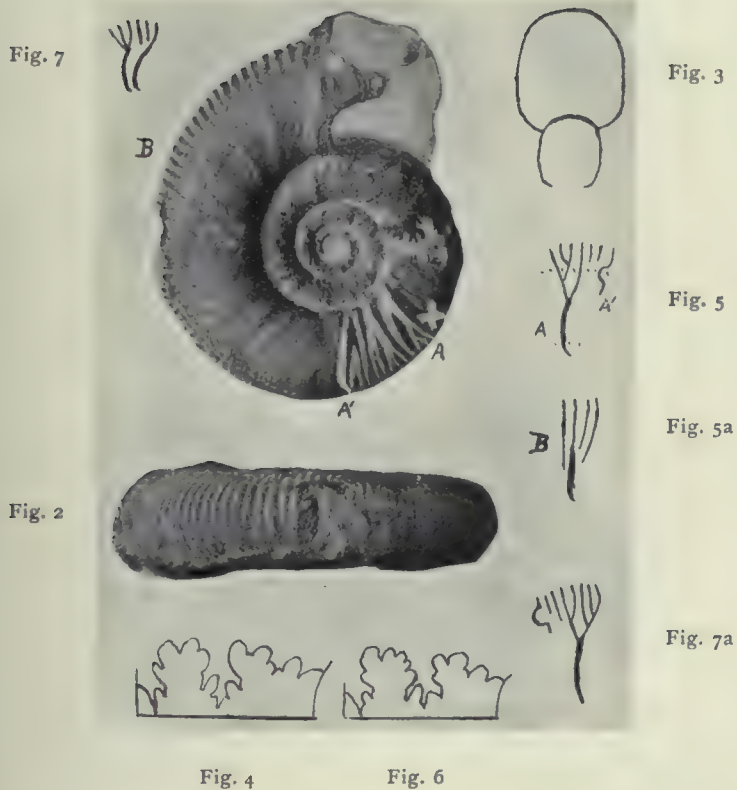
Fig. 2



AMMONITES POCULUM, (Bean MS.) Leckenby 1859, "type spec."
 Q.J.G.S. XV, 9; 1, 4*b*, *c*; "Near Gristhorpe Bay, Yorkshire
 "Kell. R." [Grey, calc., few large ool. gr.]; Sedg. Mus., Cambridge
 (Leckenby Coll.) S. 59, 37, 37 (34), 36

POCULISPINCTES POCULUM, BEAN-LECKENBY SP.
 Divesian, *vertumnus*; Genotype, Holotype

Fig. 1



AMMONITES POCULUM, (Bean MS.) Leckenby 1859, Paratype
 Q.J.G.S. XV, 9; 1, 4a; "Near Gristhorpe Bay, Yorkshire"
 "Kell. R." [grey, calc., few large ool. gr.]; Sedg. M., Cambr. (Leck. Coll.)
 S. 47, 34, 29, 42'5. [Figs. 6, 7, From another ex. Loc. etc. id.]

POCULISPINCTES AURICULARIS, nov.
 Divesian, *vertumnus*; Holotype. See CLXXXV

Fig. 1

Fig. 2



Fig. 3

Fig. 4

AMMONITES PERSONATUS, BEAN MS. (SIMPSON, 1843, Holotype)
 P. 9; "R[obin] H[oods] Bay; L.L.," 1855, 38. "Ind. Band 26," 1884, 66
 Whitby M. 2125; ϕ . 28.5, 35, 31, 35. [Figs. 3, 4, Paratype, with
 "*A. multicostatus*" [Agass. sp.]; W.M. 67]. See LXXV

AGASSICERAS PERSONATUM, BEAN-SIMPSON SP.
 Lymian, *Agassiceras*. A phaulomorph

Fig. 1

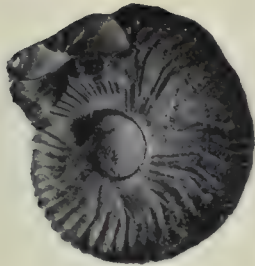


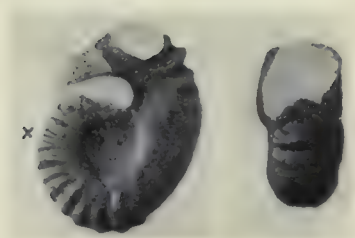
Fig. 2

AMMONITES ERRATUS, SIMPSON 1843, Holotype
P. 8; "South of Whitby, [Yorkshire]; Jet Rock," Upper Lias
Whitby Museum, 90; ϕ . 34.5, 45, 26, 23. See XIII
A cripple (**dysmorph**) without keel; cf. *Hild. bifrons*, CXIV B

PSEUDOLIOCERAS ERRATUM, SIMPSON SP.
Whitbian, *exaratum*

Fig. 1

Fig. 2



x 1.3

An ellipticone Oppelid
Burton Bradstock, Dorset ; Inf. Ool. [White Bed,
Q.J.G.S. LXVI, 1910, 69] ; S. B., ex Darell, Coll. 3363
S. 20, 41, 35, 29

CADOMOCERAS COSTATUM, nov.
Bajocian, *niortensis* ; Holotype

Fig. 1



Fig. 2

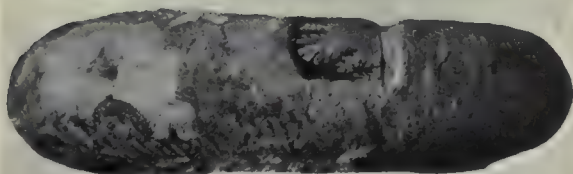
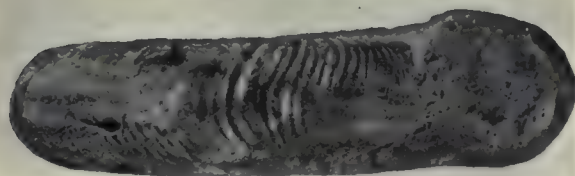


Fig. 3



PERISPINCTES MARTINSII

"Halfway House [Nether Compton, Dorset]; *garantiana*"
J. W. T. Coll.; S. 76, 26, 27⁵, 52; 66 ribs; max. c. 95; See CLXII

VERMISPINCTES SUBDIVISUS, nov.

Vesulian [Eningenian], *garantiana* [*truelleri*?]; Holotype

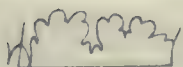
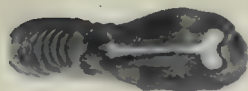
Fig. 3
× c. 3Fig. 1
× 1.3

Fig. 2



PERISPINCTES MARTINSII; S. BUCKMAN, 1881
Q.J.G.S. XXXVII, 602; "with the termination"; Louse Hill
Nether Compton, Dorset; "I. O. [above Irony Bed], *Cosm. park. z.*"
S. B. Coll. 3175; S. 34, 26.5, 26.5, 50; 38 ribs; c. $\frac{1}{2}$ wh. body-ch.

PSEUDOBIGOTELLA OTIOPHORA, nov.
Bajocian, *niortensis*; Holotype. Cf. CLXI



COSMOCERAS CAUMONTII; S. BUCKMAN 1881
 Q.J.G.S. XXXVII, 600; [Frogden Quarry], "Oborne, Dorset"
 "I. O. [Roadstone (up. part)], *Humphr. z.*; S. B. Coll. 3273
 S. 34, 25, 28, 55; c. 1 whorl body-ch. See CLXIX

CAUMONTISPHINCTES BIFURCUS, nov.
 Bajocian, *niortensis*; Holotype



AMMONITES GRACILIS, J. BUCKMAN 1844, Holotype
Geol. Chelt. 71, 104; III, 6; *Siemiradzka*? S. B. 1904, Pal. U. 38
Sevenhampton Common, Glos; Stonesfield Slate; Manchester M.
S. 146, 40, 15, 30, flattened; Est. 112, 36, 27, 36; max. c. 210 +

GRACILISPINCTES GRACILIS, J. BUCKMAN SP.
Stonesfieldian, *gracilis*; Genotype

Fig. 1

Fig. 2

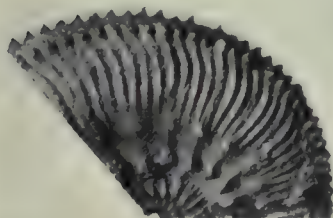
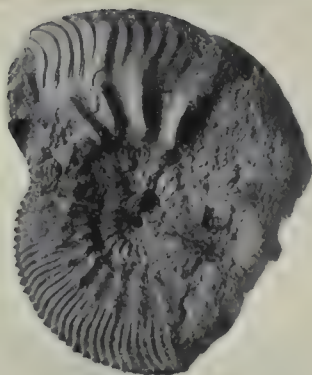
Fig. 3 $\times 1.5$ 

Fig. 4

AMMONITES GULIELMI, J. SOWERBY, Topotype?
 1821, Min. Conch. IV, p. 5; CCCXI
 [Kellaways, Wiltshire; Kellaway Rock, upper part]
 J. W. T. Coll.; S. 49, 39, 26 (22), 32

GULIELMICERAS GULIELMI, J. SOWERBY SP.
 Callovian, *gulielmi*; Genotype

Fig. 1

Fig. 2.



Fig. 3

Fig. 3a

AMMONITES OMPHALOIDES, J. SOWERBY 1819; Topotype
 M.C. III, 74; CCXLII, 5; "Weymouth, Dorset; Oxf. Clay"
 Geol. Surv. Engl. Coll., 30569; S. 26, 42, 57, 31
 S. 34'5, 41, 57, 29; 36, 47, 60, 29; ➔ sudden jump. See CLXX

PAVLOVICERAS OMPHALOIDES, J. SOWERBY sp.
 Divesian, *vertumnus*; p. 18



Fig. 1

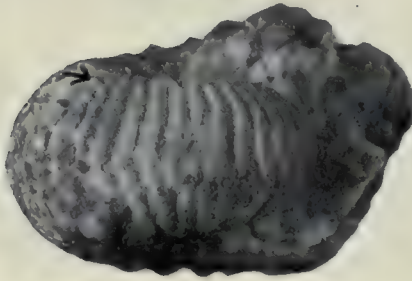


Fig. 2

QUENSTEDTICERAS SUTHERLANDIÆ

Pavloviceras bathyomphalum, T.A., III, 1920, p. 18; Holotype
 "St. Ives, Hunts; Oxf. Clay"; J. W. T. Coll.; S. 26, 44, 67, 27
 S. 34, 46, 70, 26; 50, 45, 65? 24; size 59 mm.; max. c. 90

PAVLOVICERAS BATHYOMPHALUM, S. BUCKMAN
 Divesian, *vertumnus*. See Pl. CXCv



Fig. 1

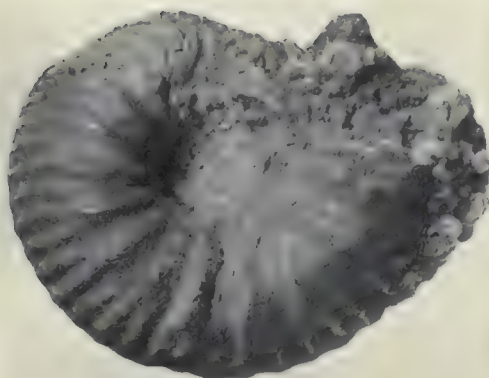


Fig. 2

CARDIOCERAS GOLIATHUS

Pavloviceras stibarum, T.A., III, 1920, p. 18; Holotype
"St. Ives, Hunts; Oxf. Clay"; J. W. T. Coll.; S. 34, 48, 70, 23'5
S. 59, 43, 75, 25; size 63 mm.; max. c. 90. See Pl. CXCVI

PAVLOVICERAS STIBARUM, S. BUCKMAN
Divesian, *vertumnus*





Fig. 2



Fig. 1

CARDIOCERAS aff. VERTEBRALE

Vertebriceras dorsale, T.A., III, 1920, p. 16Cowley, near Oxford; Lower Calcareous Grit
S. B. Coll. 2780; S. 80, 35, 42.5 (38), 39; max. c. 90VERTEBRICERAS DORSALE, S. BUCKMAN
Argovian, *Vertebriceras*; Genotype, Holotype



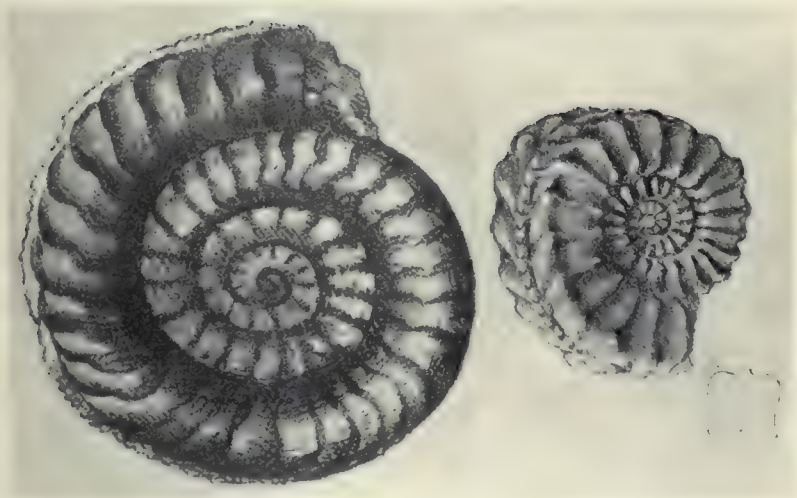


Fig. 1

Fig. 2

AMMONITES BUCKMANII, MOXON 1841

Foss. British Strata, Pl. xxiv, f. 5 ; copy of Protograph [J. Buckman del.]

Fig. 2, Copy of fig. (unnamed) lithographed [by Mrs. Rowe ?] for
Geol. Chelt., new Ed., 1844 ; but not published. See LII

PALTOPLEUROCERAS BUCKMANII, MOXON SP.

Domerian, *spinatum*



Fig. 2

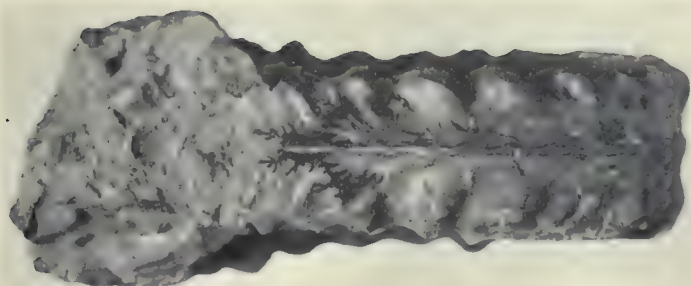


Fig. 1

AMMONITES BUCKMANII, Moxon, 1841, Holotype
 "Neighbourhood of Cheltenham [Alderton Hill, Glos]; Lias Marlstone"
Pleuroceras hawskerense, S.B., Q.J.G.S., XLV, 1889, 653; S.B., ex J.B.,
 Coll. 3310; S. 85, 33, 40 (25), 43.5; max. c. 120. Orn. 5* to c. 13 mm.

PALTOPLEUROCERAS BUCKMANII, MOXON SP.
 Domerian, *spinatum*



Fig. 3.

Fig. 1.



Fig. 2.

PERISPINCTES PSEUDOMARTINSI, SIEMIRADZKI
 1899, Mon. *Per.* p. 328; xxii, 27; [Burton Bradstock, Dorset]
 Inf. Ool., [*Astarte* Bed, (Q.J.G.S., LXVI, 1910, 73, Bed 4)];
 S. B., ex Darell, Coll. 888; S. 87, 33, 33, 38·5; 47 ribs; max. c. 170.

PRORSISPINCTES PSEUDOMARTINSI, SIEMIRADZKI SP.
 ENINGENIAN, *garantiana*; Genotype Cf. Pl. CLXII

Fig. 3

Fig. 1a

Fig. 2 $\times 0.5$ Fig. 1 $\times 0.5$

PERISPINCTES DAVIDSONI, S. BUCKMAN, 1881, Holotype
 Q.J.G.S., XXXVII, 602; 1882, Proc. Dorset F.C., IV, 144; IV, 1
 "Osborne, Dorset; *Humph. z.*" [1893, § xv, 4]; Manchester M. (S.B. Coll.)
 L. 11359; S. (42, 28.5, —, 46 ?); 184, 27.5, 20.5, 48. See Pl. CLX

LEPTOSPINCTES DAVIDSONI, S. BUCKMAN SP.
 Bajocian, *niortensis*



Fig. 1a $\times 2$ 

Fig. 1

" ' PERISPHINCTES ' DAVIDSONI " ; S. Buckman 1893
Q.J.G.S., XLIX, 500, § xv, 4 ; " Frogden Quarry, Osborne, Dorset
" Inf. Ool. ; *Niortensis* ; " body-ch. with aperture ; S.B. Coll. 3390
S. 50, 25, 25, 50 ; 120, 25, 17, 54 ; c. 52 ribs penult. whorl

LEPTOSPHINCTES CORONARIUS. nov.
Bajocian, *niortensis* ; Holotype





× 0.57

PARKINSONIA NEUFFENSIS

Haselburgites admirandus, T.A., III, 1920, p. 30
"Haselbury, Som."; [*Park. z.*]; S.B. Coll. (purch), 654
S. 129, 33, 36, 42; 218, 36, 29, 37; max. c. 410 +

HASELBURGITES ADMIRANDUS, S. BUCKMAN
Eningenian, *truellei*; Genotype, Holotype



Fig. 2 \times 0.57Fig. 2 \times 0.8

PARKINSONIA NEUFFENSIS

"Haselbury, Somerset"; [Quarry near Church; top beds]

A light yellow, finely oolitic, soft stone

HASELBURGITES ADMIRANDUS, S. Buckman
Eningenian, *truellei*; Genotype, Holotype





LYTOCERAS cf. SUTNERI, GEYER

“Munger, near Radstock, Somerset

“Charmouthian, *valdani*”; J.W.T. Coll.; S. 117, 38, 36? 41

Cf. Pl. CXXX

KALLILYTOCERAS INTERLINEATUM, NOV.

Wessexian, *valdani*; Genotype, Holotype



Fig. 3 × 2

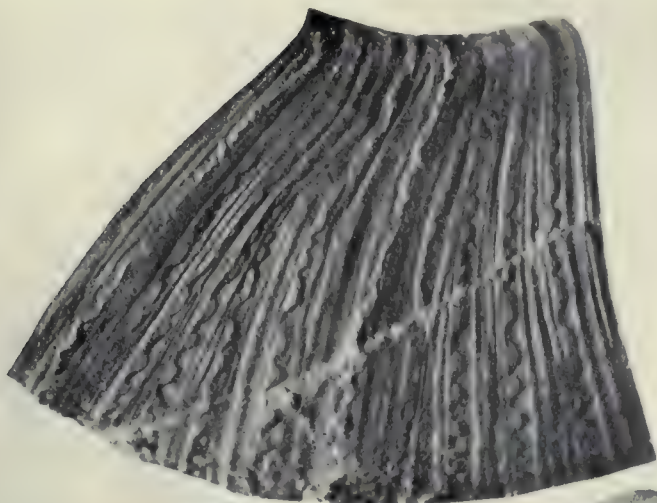


Fig. 2 × 2

Fig. 1

LYTOCERAS cf. SUTNERI, GEYER

Figs. 1, 2, "Old Pit Quarry, Clandown, Radstock, Somerset
 " Charmouthian, *valdani*," *Acanthopleuroceras* sp. (impression)
 J.W.T. Coll. ; S. 46, 40, 32, 41. Fig. 3, Holotype, test × 2, Pl. CCIV A

KALLILYTOCERAS INTERLINEATUM, NOV.
 Wessexian, *valdani*



Fig. 3

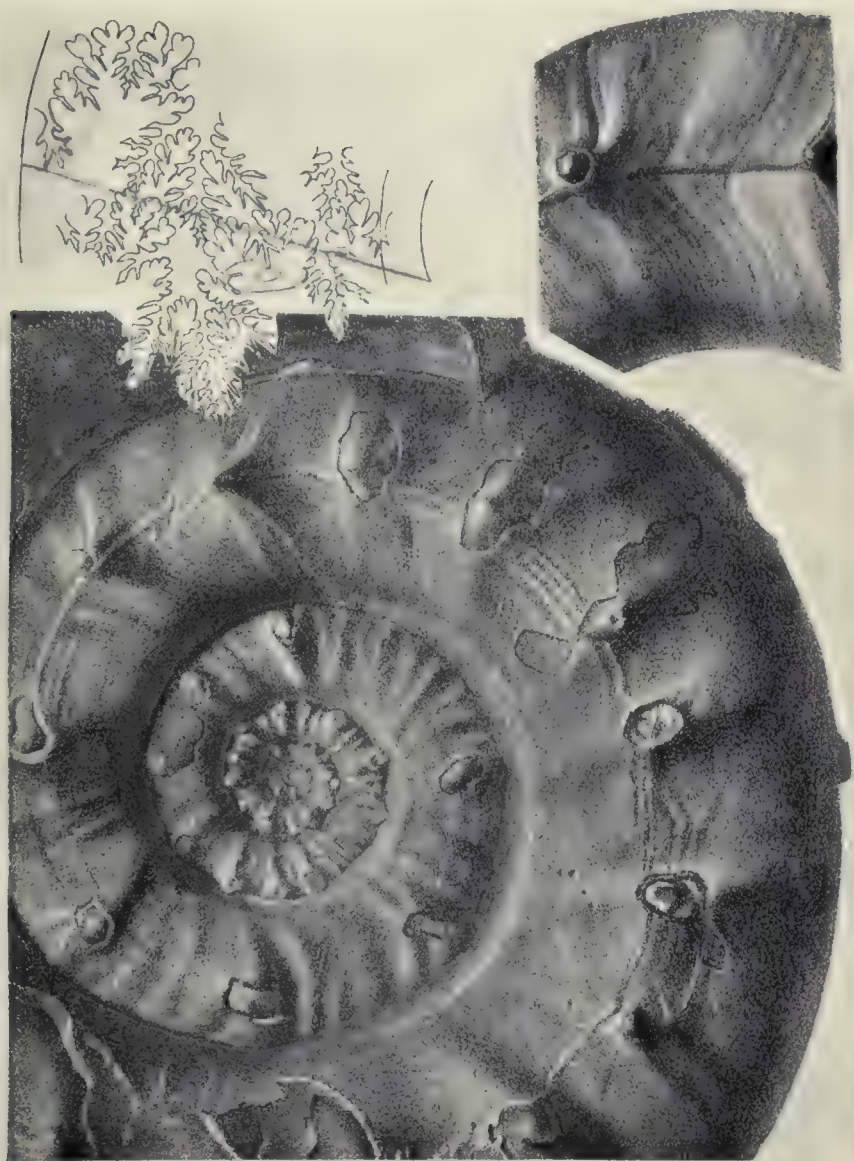
Fig. 2 $\times 1.5$ 

Fig. 1

A tuberculate SONNINIA

[Sandford Lane], "Sherborne, Dorset; Inf. Ool."; [Top of Foss. Bed. (Q.J.G.S., XLIX, 1893, 492)]; S.B., ex Darell, Coll. 995

PAPILLICERAS ACANTHERUM, NOV.
Bajocian, *sauzei* (pre-*sauzei* ?); Holotype

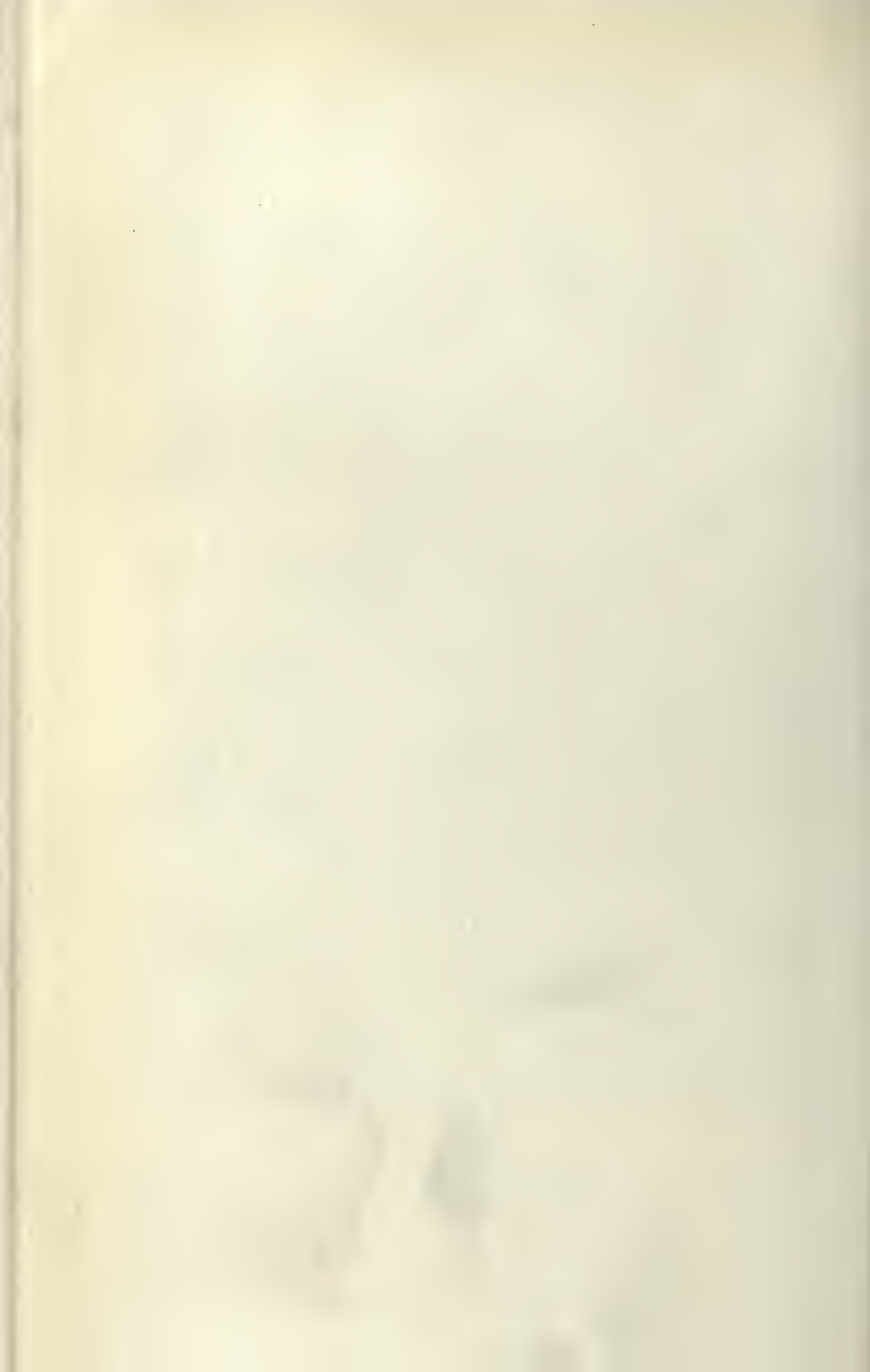


Fig. 1

Fig. 2



× 0.6

A tuberculate *SONNINIA*

No. 995; S. 115, 37.5, 30.5 (24.5), 37.5; 215, 34.5, 25 (22), 40.5
 Max. c. 220. → End of septum in carina; x, last s.l.
 See Pl. CL B and correct there '28 (24)' to 23 (21)

PAPILLICERAS ACANTHERUM, nov.
 Bajocian, *sauzei* (pre-*sauzei*?) ; Holotype

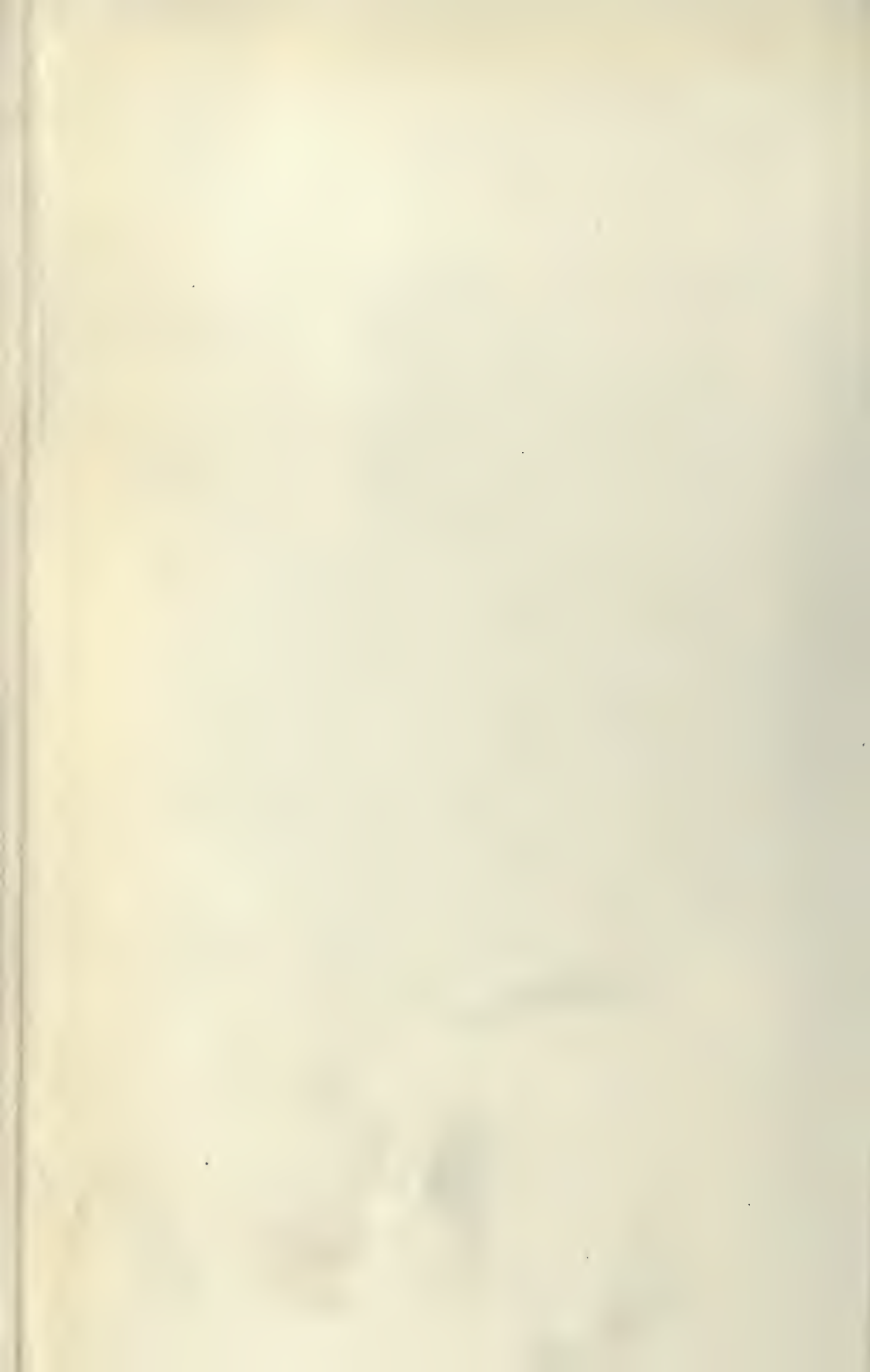


Fig. 1, $\times 0.57$

Fig. 2, N.S.

*HAMMATOCERAS* aff. *INSIGNE*

Ry. Cutting, Cole, Bruton, Som. ; Lias-Ool. (Bruton) Sands
S.B. Coll. (purch.) 783 ; S. 164, 33.5, 25.5, 38 ; with further pieces wholly-
septate (Fig. 2), S. 275, 36.5 (39.5), 33, 38 (35.5) ; max. c. 330+

HAMMATOCERAS *CAPPUCINUM*, nov.

Yeovilian, *Hammatoceras* ; Holotype. Cf. CLXXX

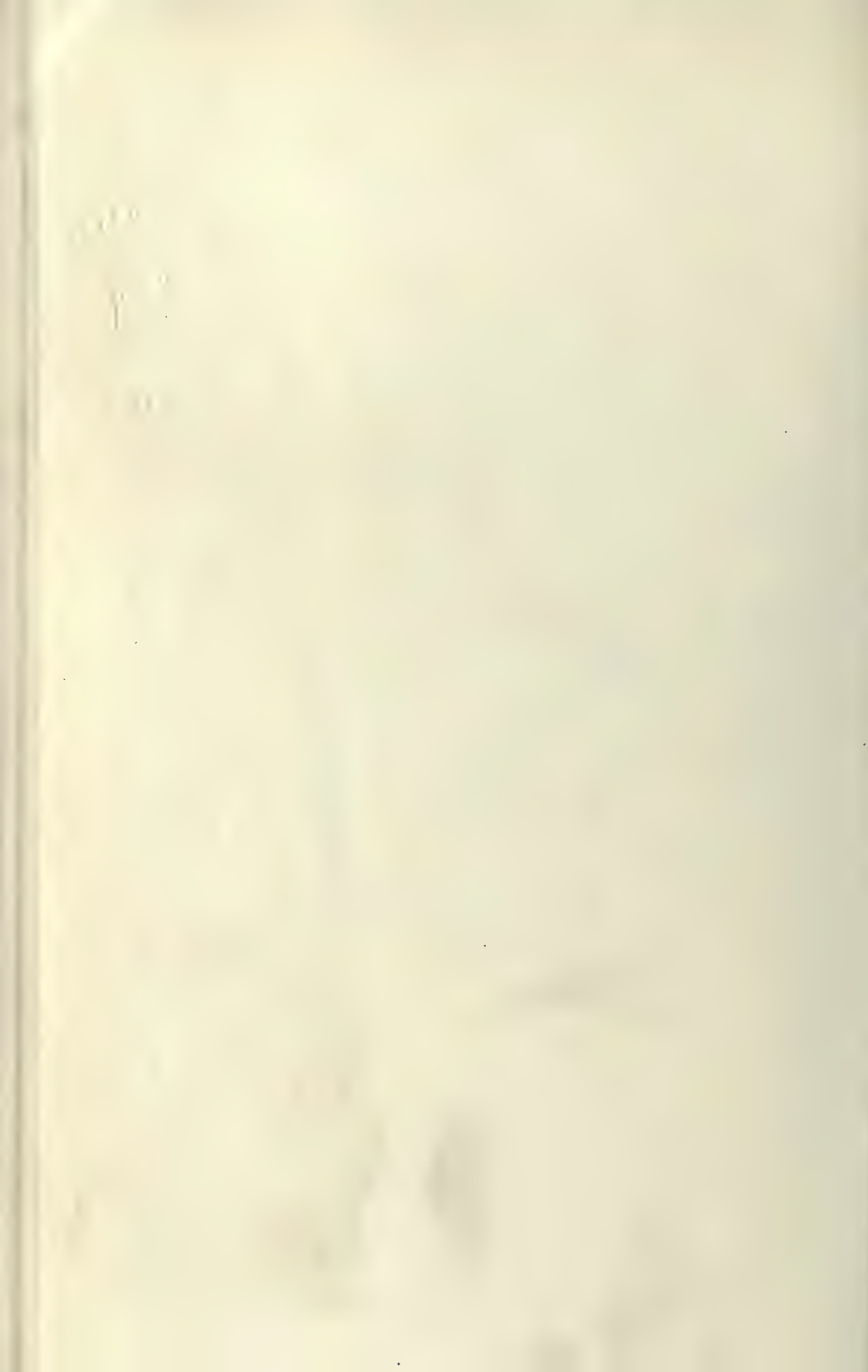


Fig. 1



Fig. 2 X 0.4

HAMMATOCERAS aff. INSIGNE

[Ry. Cutting, Cole, Bruton, Som.], "England," [Yellow Sands]
 S.B., Q.J.G.S., 1910, LXVI, 81; Yale Univ. Mus. (U.S.A.) Coll.
 S. 268, 37, 33, 33.5; max. c. 380+

HAMMATOCERAS CAPPUCINUM, NOV.

Yeovilian, *Hammatoceras*; Paratype

1866

B

1866

Fig. 1.

Fig. 2 $\times 0.8$

HAMMATOCERAS SP.

"Charolles (Saône et Loire), France"

Yale University Museum (U.S.A.) Coll. No. 45

S. 149, 38, 36, 26; max. c. 210+

PACHAMMATOCERAS PACHU, nov.

Yeovilian, *Hammatoceras*; Genotype, Holotype

1871

1872

1873

Fig. 1

Fig. 3



Fig. 2

AMMONITES SERPENTINUS; Moore, 1867, (cit. sp. ?)
 Proc. Somerset Arch. Soc. XIII, 194; "Ilminster, Somerset
 "Upper Lias"; Manchester Mus., ex C. Moore Coll., L. 11543
 S. 86, 30, 17.5, 41.5; 124, 26, 16.5, 55; max. c. 140

HILDOCERATOIDES PROPESERPENTINUS, NOV.
 Whitbian, *falciferum*; Genotype, Holotype. See CXXXVIII A



Fig. 1



Fig. 2.

AMMONITES CRASSIUSCULUS, SIMPSON, 1855, Holotype
Pp. 56, 57; "[Whitby], Yorkshire; hard bands of the Middle Lias";
Whitby Museum, No. 499; ϕ . 37, 25.5, 34, 49. See No. 91.

PORPOCERAS CRASSIUSCULUM, SIMPSON SP.
Whitbian, *athleticum*



Fig. 1

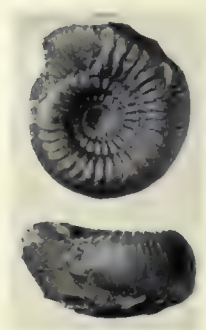


Fig. 2

AMMONITES INCRASSATUS, SIMPSON, 1855, Holotype
P. 54; " [Whitby], Yorkshire; U[pper] L[ias] "; pyritized
[Middle Lias, pyritous shales]; Whitby Museum, No. 149;
p. 24, 30, 48, 45. See No. 119

CÆLOCERAS INCRASSATUM, SIMPSON SP.
Wessexian, *pettos*

Fig. 1



Fig. 2

"*PERISPHINCTES* cf. *EVOLUTOIDES*, SIEMIRADZKI"
Burton Bradstock, Dorset ; Inf. Ool., [3rd. Bed, (*truellei*)]
S.B., ex Darell, Coll. 895 ; S. 42, 28·5, 39, 47·5 ; 40 ribs

PHANEROSPHINCTES PHANERUS, nov.
Eningenian, *truellei* ; Genotype, Holotype

Fig. 4



Fig 3

Fig. 1

Fig. 2

AMMONITES ALLIGATUS, (BEAN MS.) LECKENBY, 1859, Holotype
Q.J.G.S., XV, 9; II, 2; Scarborough Castle Rock, Yorkshire
Kelloway Rock; bluish-grey calc., ool. grains rare
S. 44, 28.5, 29.5, 48; 60 ribs; max. c. 53. See Pl. CXXXIX

ALLIGATICERAS ALLIGATUM, BEAN-LECKENBY SP.
Vertumniceratan, *vertumnus*. [Aug. 1923]
[Oct. 1927]

Fig. 1



Fig. 2

"AMMONITES KOENIGI"

"Chippenham, Wiltshire; Oxf. Clay," [Kellaways Clay (a)]
Geol. Surv. Engl., No. 30532; S. 61, 32, 24'5 (22), 40; 17 ribs

PROPLANULITES CAPISTRATUS, NOV., p. 37
Callovian *koenigi* (*majesticus*); Holotype

X

Fig. 1

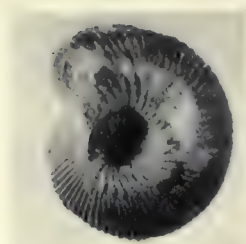
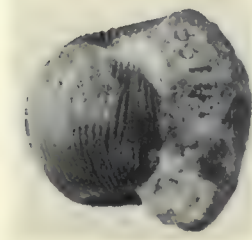


Fig. 2



"AMMONITES BRONGNIARTI"

"D[undry, Somerset], f[ar] q[uarry]" = South Main-road Quarry
 "Inf. Ool." [Ironshot Ool.], (Q.J.G.S. LII, 1896, 691, § 1X, Bed 4)
 S. B. Coll., pres. E. Wilson; S. 31, 41, 97, 21; max. c. 47

LABYRINTHOCERAS EXTENSUM, nov.
 Bajocian, *sauzei*; Holotype. See CXXXV

Fig. 1

Fig. 1a

Fig. 4 X

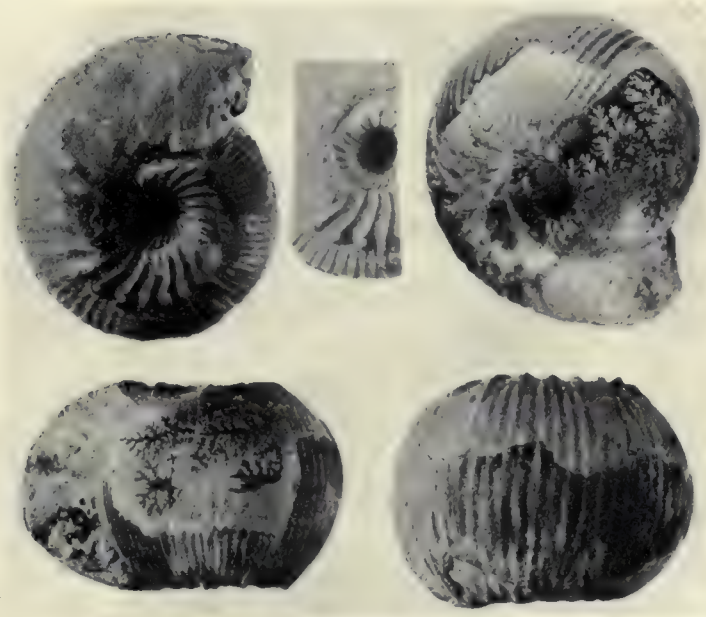


Fig. 2

Fig. 3

A coronate SPHÆROCERATID

Frogden Quarry, Osborne, Dorset ; Inf. Ool., green-grained Marl
(Q.J.G.S., XLIX, 1893, 500, § xv, 9) ; S.B., ex Darell, Coll. 1228
S. 30·5, 37, 87, 21 ; 45, 33, 71, 30 ; max. c. 55. Last s.l. black, fig. 4

FROGDENITES SPINIGER, nov.
Bajocian. *sauzei* ; Genotype, Holotype

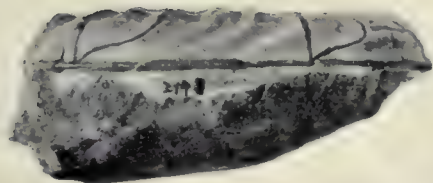
Fig. 1



Fig. 2



Fig. 3



AMMONITES MURLEYI, J. BUCKMAN in MOXON, 1841
 Foss. Brit. Str. xxiv, 6; F. 1, Protograph, J.B. del. (copy)
 "Up. lias shale." F. 2, 3, (Holotype?) Paratype; "Dumbleton, Glos"
 Geol. Chelt. 1844, pp. 36, 90; S.B., ex J.B., Coll. 2178; S. 62, 34, 23'5, 40

MURLEYICERAS MURLEYI, J. BUCKMAN-MOXON SP.
 Whitbian, *murleyi*; Figs. 2, 3, Genotype

Fig. 1.

Fig. 2.

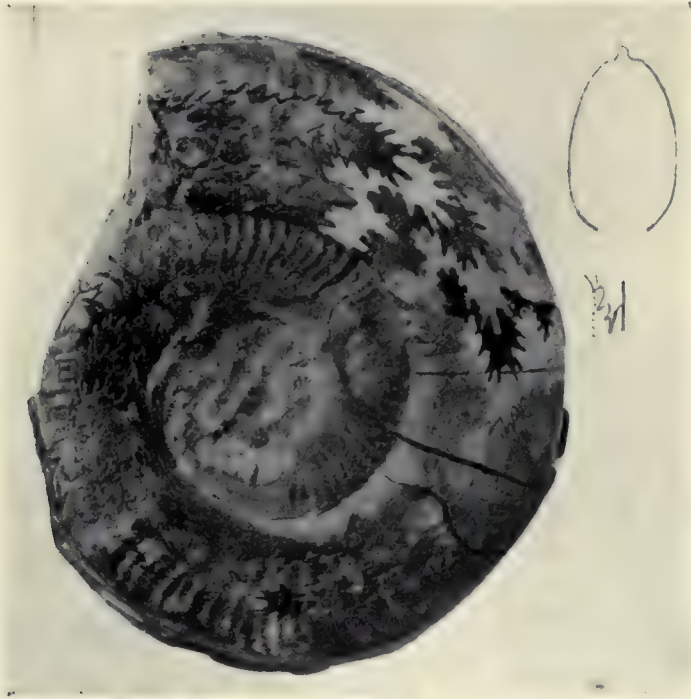


Fig. 3

AMMONITES SERPENTINUS; MOORE 1867, (cit. sp.?)
 Proc. Som. Arch. Soc. XIII, 194, "Ilminster, Somerset; Up. Lias"
 Manchester Mus., ex C. Moore Coll., L. 11544
 S. 86, 28, 17, 47.5; max. c. 102. See CXXXVIII B

HILDAITES SUBSERPENTINUS, nov.
 Whitbian, *falciferum*; Genotype, Holotype

Fig. 1



Fig. 2

AMMONITES CRASSULUS, SIMPSON, 1843, Holotype
P. 20; " [Whitby], Yorkshire "; " U.L. 6," (Simpson, 1884, p. 86)
Whitby Museum, No. 489; *φ.* 23·5, 32, 38, 47. See Pl. CLVII

DACTYLIOCERAS CRASSULUM, SIMPSON SP.
Whitbian, *falciferum*

Fig. 1



Fig. 2



X 2

AMMONITES HUNTONI, SIMPSON, 1843, Holotype ?
P. 41 ; " Robin Hood's Bay, Yorkshire ; lowest beds of lias ;
" L. L. y " (1884, p. 119) ; Whitby Museum, No. 477
 ϕ . 10.5 (21), 45, 26, 26. See No. 16 & I, *viii*

TRAGOPHYLLOCERAS HUNTONI, SIMPSON SP.
Wessexian, *ibex*

Fig. 2

Fig. 1



x 1.25

AMMONITES ROBINSONI, SIMPSON, 1843, Holotype
P. 42; " Robin Hood's Bay, Yorkshire; lowest beds of lias "
A cast of a bronze colour from a grey sandy matrix
Whitby Museum, No. 478; S. 24, 49, 23, 21. See Pl. CCXIX

TRAGOPHYLLOCERAS ROBINSONI, SIMPSON SP.
Wessexian, *ibex*



x 0.64

AMMONITES TURNERI, J. de C. SOWERBY
(1824, Min. Conch., V, 75; ccccli, upper fig.)
Ex resident Brislington, Som.; Miss M. G. Horder Coll.
S. 203, 32, 28, 46; 49 ribs; max. c. 220. See No. 120

ARIETITES TURNERI, J. de C. SOWERBY SP.
Mercian, *turneri*

Fig. 1

Fig. 2



x 0.64

AMMONITES TURNERI, J. de C. SOWERBY
Ex resident Brislington, Som. ; Miss M. G. Horder Coll.
["Kelston, Somerset ; *gmuendense-sauzeanum* " ; J. W. T.]

ARIETITES TURNERI, J. de C. SOWERBY SP.
Mercian, *turneri*

Fig. 1



Fig. 2

× 0.7

AMMONITES SCIPIONIS; REYNĒS
(1879, Mon. Amm., xxviii, 3, 4); Newtown, Paulton, Som.; J.W.T. Coll.
S. 95, 37, 24, 39; (190, 37, 24, 40, est.); max. c. 270+. See No. 66.

AETOMOCERAS NODULATUM, nov.
Lymian, *scipionianum*; Holotype

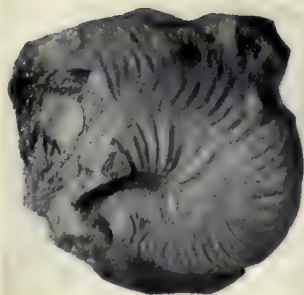
Fig. 1

Fig. 2



AMMONITES ERUGATUS, (BEAN MS.), PHILLIPS, 1829, Holotype
Geol. Yorksh., 163, 174, 192; XIII, 13; [Robin Hood's Bay], Yorkshire
"Upper Lias Shale"; Whitby Museum, No. 100; ϕ . 42, 27, 21.5, 49

PSILOCERAS ERUGATUM, BEAN-PHILLIPS SP.
Hettangian, *planorbis*



AMMONITES OCULATUS, (BEAN MS.) PHILLIPS, 1829, Holotype
Geol. Yorksh., 138, 175, 188; v, 16; "Scarborough, Oxf. Cl." (blue,
sandy); Yorkshire Phil. Soc., York, (Bean Coll.); "This specimen
"figured by Phillips," Bean's lab.; S. 39, 55, 24? 9; crushed

NEUMAYRICERAS OCULATUM, BEAN-PHILLIPS SP.
Divesian, *vernoni*; Genosyntype

Fig. 2

Fig. 1



x 0.78

"AMMONITES BERRYERI"

"Westbury, Wilts; Corallian, [Iron Ore]"

J.W.T. Coll.; S. 60? 44, 25, 27; 100, 42, 23, 28

S. 180, 37, 19, 34; max. 280+

RINGSTEADIA ANGLICA, SALFELD

Kimmeridgian (Sequanian), *Ringsteadia*; Topotype

Fig. 1

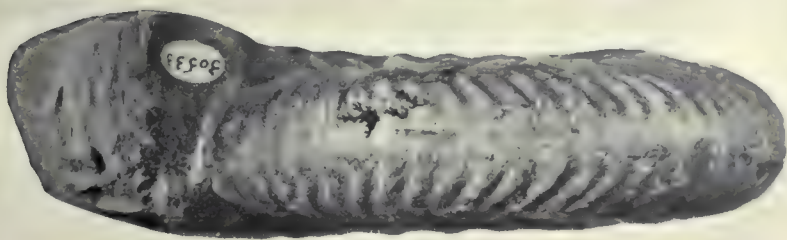


Fig. 2

X 0.79

"AMMONITES KOENIGI"

Perisph. könighi; Neum., 1871, XI, 2; *P. obtusicosta*; Petitclerc, 1915, VII, 3; "Chippenham, Wiltshire; Oxford Clay," [Kellaways Clay (a)] Geol. Surv. Engl., 30533; S. 133, 37, 27, 35; max. c. 210; LI, 42.5

PROPLANULITES MAJESTICUS, S. BUCKMAN, p. 34
Callovian, *könighi* (*majesticus*); Holotype

Fig. 1



Fig. 2

"AMMONITES KOENIGI"

Proplanulites subcuneatus, Teiss. 1887, IV, 12; "Christian Malford, Wilts"
"Oxford Clay," [Kellaways Clay (a)]; J. W. Tutchter Coll.

S. 71, 36.5, 26, 37; 82, 36, 25, 40; 22 ribs; max. c. 94

PROPLANULITES SUBCUNEIFORMIS, S. BUCKMAN, p. 37
Callovian, *koenigi*, (*majesticus*); Holotype



x 0.8

"AMMONITES BAKERIÆ"

"Kellaways, Wilts, Kell. Rock [e]"; Geol. Surv. Engl. 25649
S. 65, 37, 34, 35; 141, 37, 34(31), 35.5; 20 ribs; max. c. 250+

CRASSIPLANULITES CRASSICOSTA, S. BUCKMAN, p. 41
Callovian, post-*koenigi* (*Crassiplanulites*); Genotype, Holotype

Fig. 1

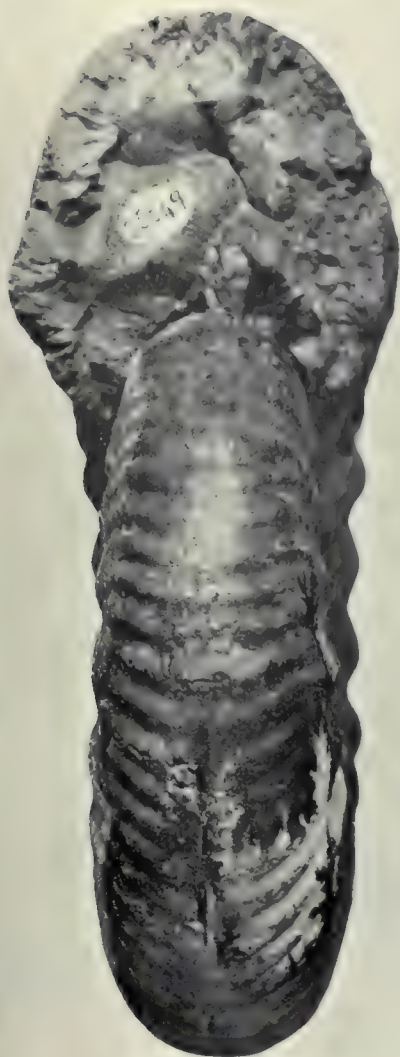
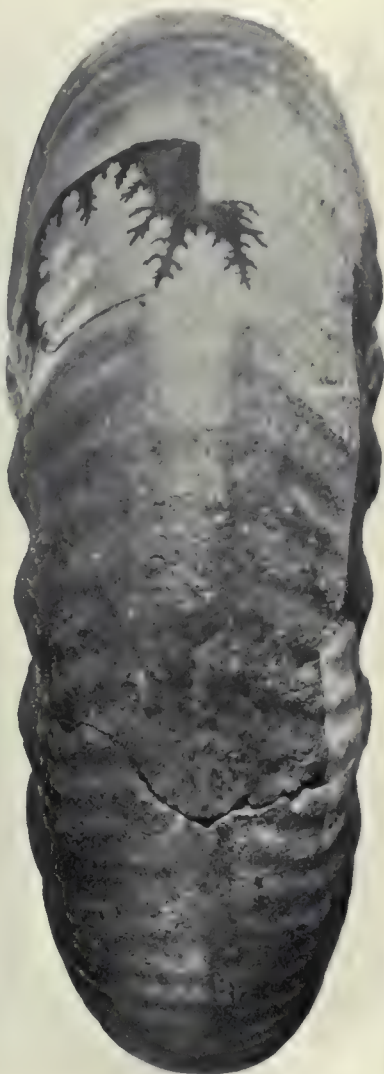


Fig. 2



"AMMONITES BAKERIÆ"

"Kellaways, Wiltshire; Kellaways Rock [c]"
Geol. Survey England, No. 25649; Nat. size

CRASSIPLANULITES CRASSICOSTA, S. BUCKMAN, p. 41
Callovian, post-*koenigi* (*Crassiplanulites*); Genotype, Holotype

Fig. 1

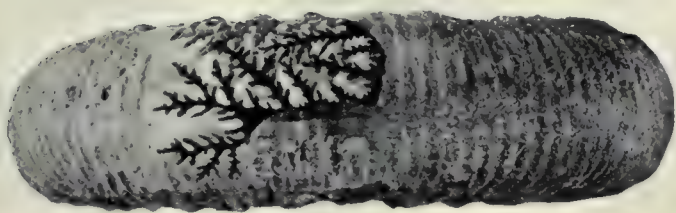


Fig. 2

"STEPHANOCERAS HUMPHRIESIANUM"

[Clatcombe], "near Sherborne, Dorset; Inf. Ool." [lowest pt. *Humphr. z.*]
S.B., ex Darell, Coll., 3471; S. 92, 25, 28.5, 54; 28 ribs; max. c. 175+

STEPHEOCERAS PLAGIUM, nov.

Bajocian, pre-*blagdeni* (*Mascheites*); Holotype

Fig. 1 $\times 0.91$ 

Fig. 1a

Fig. 2, N.S

Fig. 1b

"STEPHANOCERAS MACRUM"

[Sandford Lane], "near Sherborne, Dorset; Inferior Oolite"

[Foss. Bed, upper part], (Q.J.G.S., XLIX, 1893, 494)

S.B., ex Darell, Coll., 1220; S. 129, 23.5, 24, 57; 48 ribs; max. c. 220+

KALLISTEPHANUS KALUS, NOV.
Bajocian, *sauzei*; Genotype, Holotype

Fig. 2
X 0'34

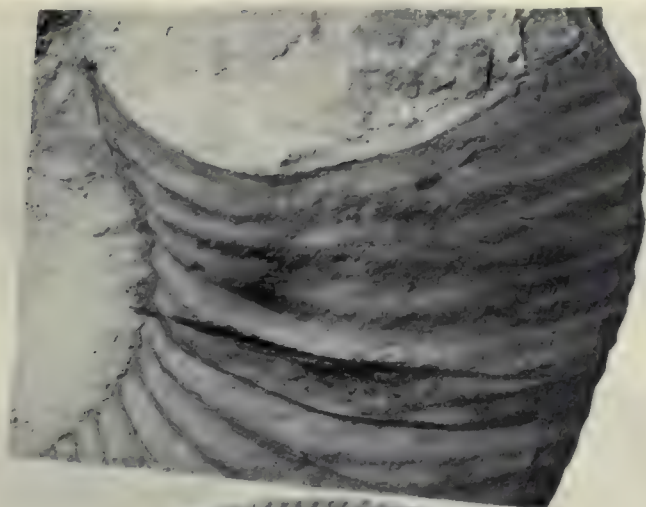


Fig. 1
X 0'155

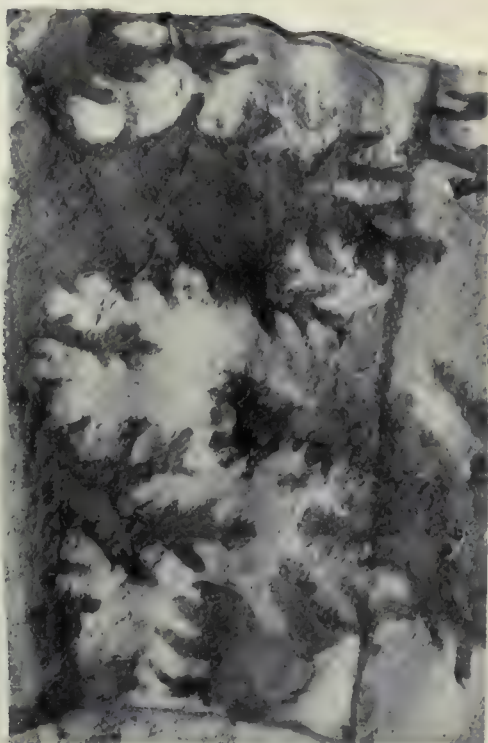


"AMMONITES GIGANTEUS"

Near Baggle Hill, (opposite Notley Abbey), Haddenham, Bucks
Portland Stone Beds; S.B. Coll., 2962, pres. Mr. Henry Reynolds
S. 640, 32, 19'5, 47; 57 or 58 ribs; Fig. 2, mouth and rib-curve

TITANITES TITAN nov.

Portlandian, *Titanites*; Genotype, Holotype

Fig. 1, $\times 0.215$ Fig. 2, $\times 0.75$ 

"AMMONITES GIGANTEUS"

Portland Stone Beds, "Creamy Limestones" (Blake)
 [Yellowish Sandstone, "Building Stone," 3rd bed down]
 S.B. Coll., 2962; Fig. 2, L2 short and rather broad

TITANITES TITAN, NOV.

Portlandian, *Titanites*; Genotype, Holotype

Fig. 1

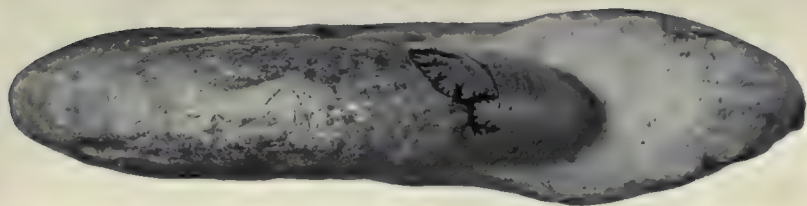
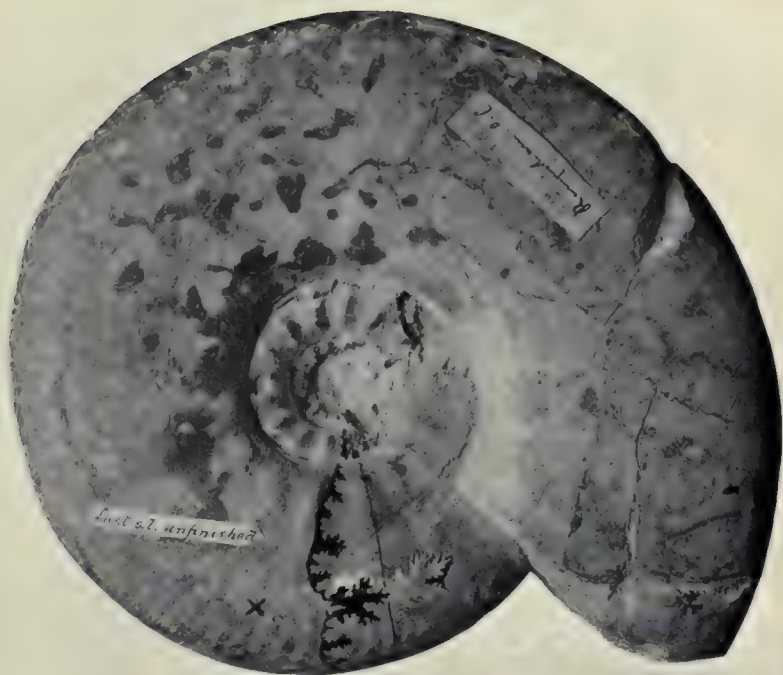


Fig. 2

× 0.74

"AMMONITES KOENIGI"

"Rampisham, Dorset; Oxford Clay" [Kellaways Clay (b)]

Geol. Survey England, ex Darell Coll., No. 30686

S. 83, 44, 26.5, 26; 92, 43.5, 25.5, 26; 147, 40, 24, 29; max. c. 190

PROPLANULITES LAEVIGATUS, S. BUCKMAN, p. 34
Callovian, *koenigi*, (*basileus*); Holotype

Fig. 1

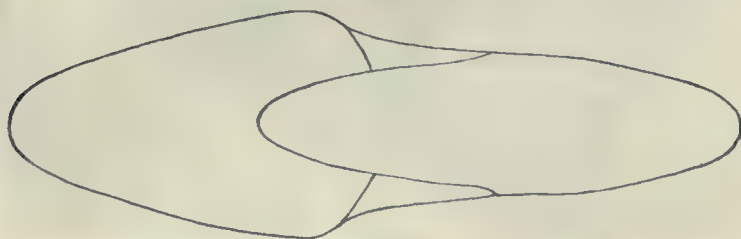


Fig. 2 X 0·91

AMMONITES HETEROPHYLLUS NUMISMALIS, QUENSTEDT
(1846, Ceph., p. 100, Pl. vi, 5); "Radstock, Somerset"; J. W. T. Coll
S. 105, 49, 31, 19; max. c. 210+

Fig. 2, Outline, section-end of whorl taken at radius

TRAGOPHYLLOCERAS NUMISMALIS, QUENSTEDT SP.
Wessexian, *ibex.* · See I, p. viii & No. 16

Fig. 2

Fig. 1



x 0.57

AMMONITES OBLIQUATUS, YOUNG & BIRD, 1828, Holotype
 Geol. Yorkshire, p. 265 ; "Hawsker shore ; hard bands"
 [Peak, near Whitby ; U. Lias ; Peak Shales] ; Whitby Museum, No. 222
 Φ . 207 (118), 30, 17, 44, — keel ; max. c. 220

PELECOCERAS OBLIQUATUM, YOUNG & BIRD SP.
 Whitbian, *variabilis*. See II, p. x



AMMONITES OBLIQUATUS, YOUNG & BIRD, 1828, Holotype
Geol. Yorkshire, p. 265, Whitby Museum, No. 222
Septicarina 4 mm. high beginning of last whorl ; reduced to a mere ridge
at end of it, nearly end of body-chamber

PELECOCERAS OBLIQUATUM, YOUNG & BIRD ~ SP.
Whitbian, *variabilis*. Cf. No. 14

Fig. 1

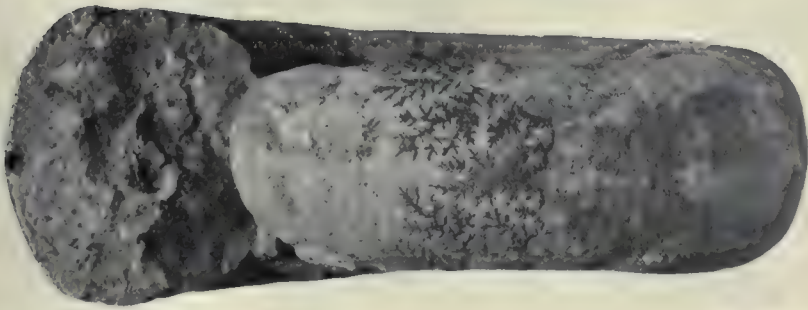


Fig. 2 × 0.6

"DEROCERAS LECKENBYI"

"Bird's Quarry, Frome Hill, Radstock, Som. ; Mid. Lias, *armatus*"
 J.W.T. Coll. ; S. 99, 37, 40, 42 ; 145, 34, 39, 43
 S. 194, 31, 37, 45 ; max. c. 350. See No. 94

APODEROCERAS LOBULATUM, nov.

Raasayan, *leckenbyi* (*Apoderoceras*) ; Genotype, Holotype

Fig. 1

Fig. 2b

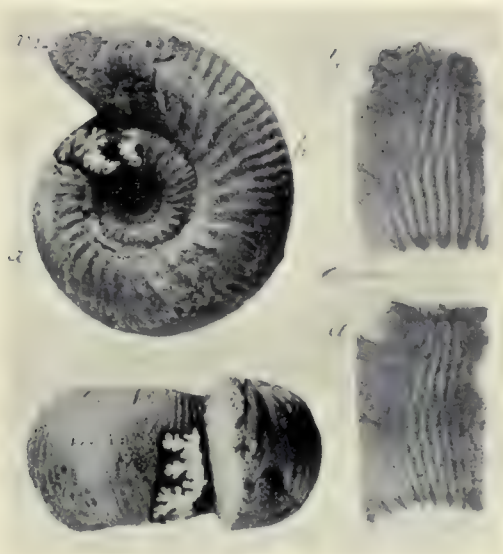


Fig. 2

Fig. 2a

"ERYCITES cf. MODESTUS, VACEK SP."

"Bradford Abbas, Dorset; Inf. Ool. [Paving Bed]"

S.B., ex Darell, Coll. 1141; S. 28, 41, 65, 36; 42, 34.5, 45, 38
F. 1, m. plain mouth; F. 2a, 2b; ventral ribs broken, alternate,)

ABBASITES ABBAS, NOV.

Aalenian, *bradfordensis* (*Abbasites*); Genotype, Holotype

Fig. 1

Fig. 2b

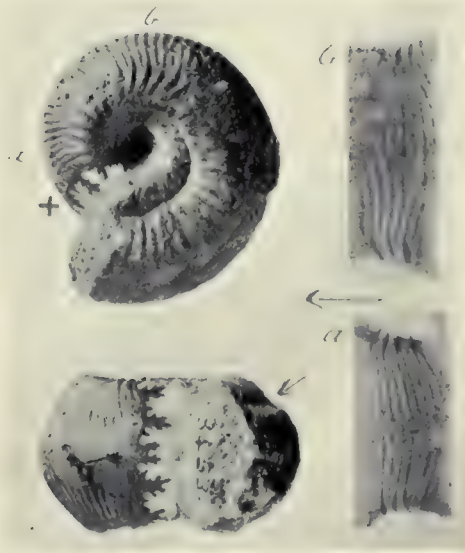


Fig. 2

Fig. 2a

"ERYCITES cf. TULCUS, GREGORIO SP."

"Ambers Knoll, Sherborne, Dorset; I.O., [c. *ringens* beds]"

S.B. Coll. 3453; S. 21, 47.5, 83, 26; 36, 37.5, 53, 36

Fig. 2, → injury; Figs. 2a, 2b; ventral ribs entire, (

AMBERSITES ÆGROTUS, NOV.

Aalenian, *bradfordensis* (*Ambersites*); Genotype, Holotype

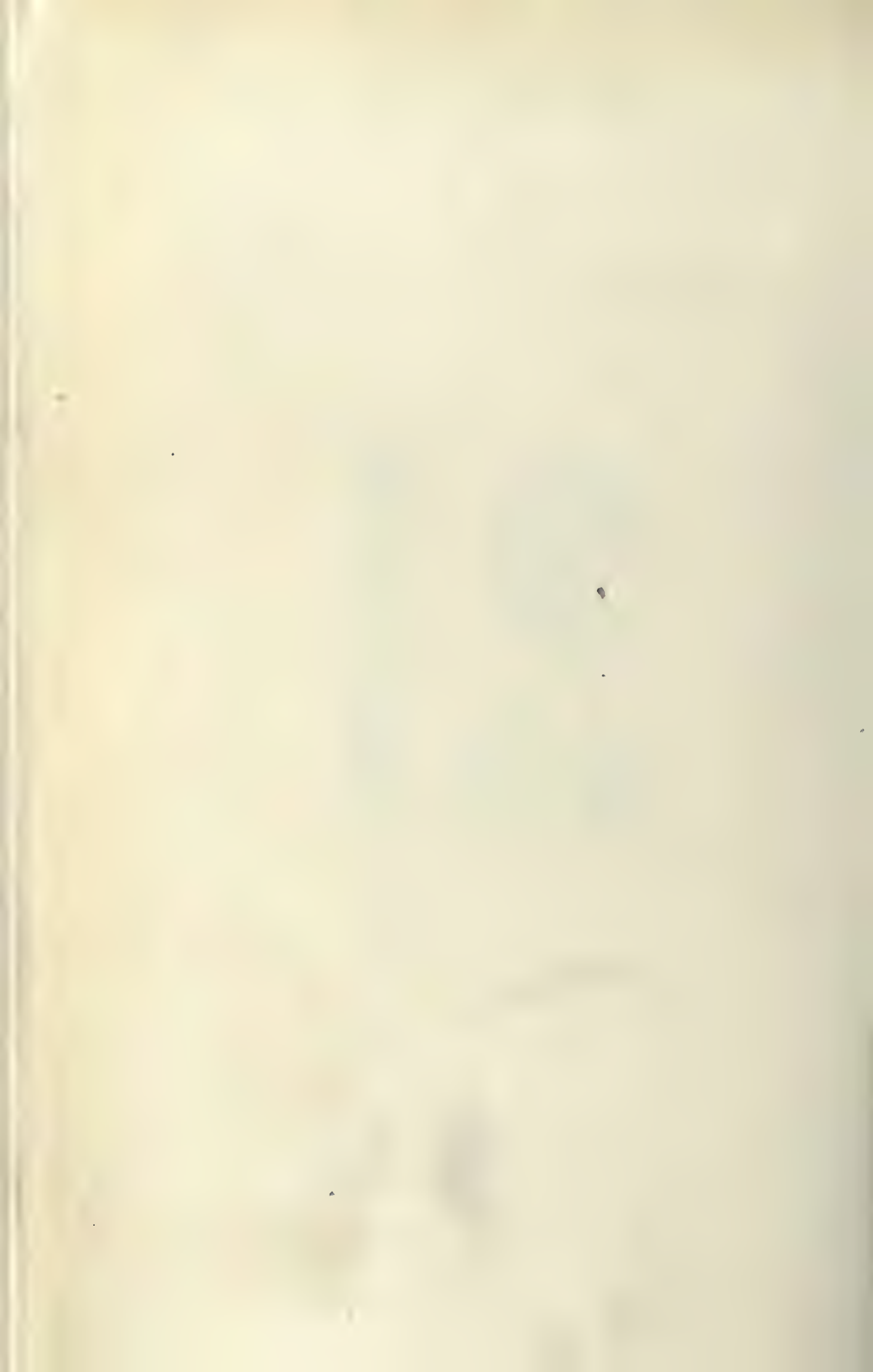


Fig. 1



Fig. 2

Fig. 3

AMMONITES HUMPHRIESIANUS, J. DE C. SOWERBY, 1825, Topotype (Min. Conch., V, 161; D, 1 [b]); *Stepheoceras*, S.B., 1898, see II, xi [Clatcombe], "near Sherborne, Dorset; I.O., *Humphr. z.*" S.B., ex J.B., Coll. 3145; S. 107, 29, 34, 49; max. 170 + F. 2, → Dorsal s.l.; Fig. 3, s.l. complete; dorsal part restored

STEPHEOCERAS HUMPHRIESIANUM, J. DE C. SOWERBY SP.
Bajocian, *Masckeites*

Fig. 1

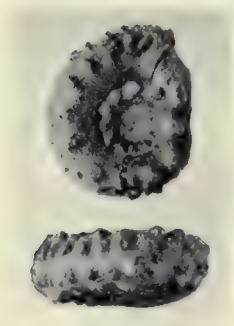


Fig. 2

COSMOCERAS SUBFURCATUM, var. ?, S. BUCKMAN, 1881
Q.J.G.S., XXXVII, pp. 600, 601. "Entirely destitute of ribs
"Frogden Quarry, Osborne, Dorset; I.O.; *Humphr. z.*, higher part"
S.B. Coll. 3474; S. 22'5, 35'5, 40, 42; max. 22'5

STRENOCERAS APLEURUM, nov.
Bajocian, *niortensis*, Holotype

Fig. 1

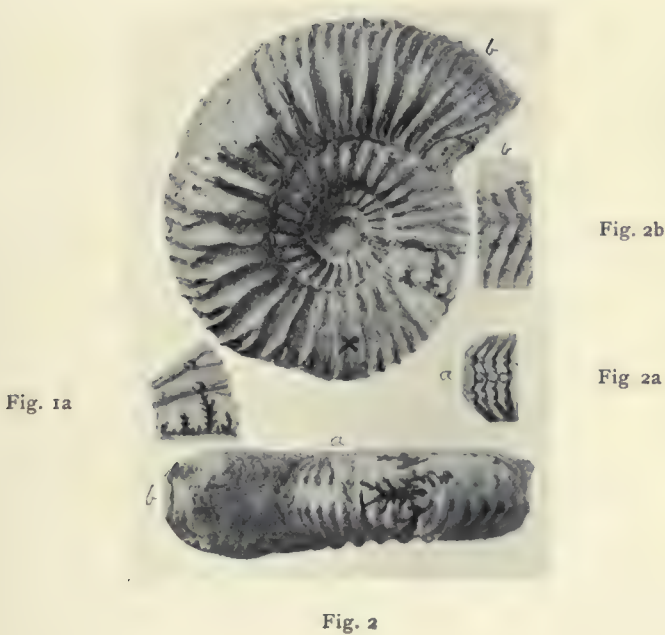


Fig. 2

GARANTIANA latesulcata sp., S. BUCKMAN, 1910
 Q.J.G.S., LXVI, 71; "Louse Hill, Dorset; I.O., Rotten Bed"
 S.B. Coll. 3302; S. 27.5, 33, 40, 38; 50, 35, 29, 41; 30 ribs; max. 52
 F. 2a, Venter, details exaggerated; F. 2b, at b, rubbing, ribs nearly joined

HLAWICERAS PLATYRRYMUM, NOV.
 Bajocian, niortensis; Genotype, Holotype

Fig. 1



Fig. 2

PERISPINCTES DAVIDSONI; S. Buckman, 1881, Paratype
1882, Proc. Dorset F.C., IV, 144; IV, 2; "Frogden Q., Osborne, Dorset
" *Humph. z.*" [Q.J.G.S., XLIX, 1893, § xv, 4]; Manchester M. (S.B. Coll.)
L. 11360; S. 42, 24, 19, 54; c. 53 ribs. Body-ch. complete; mouth plain

CAUMONTISPINCTES APLOUS, nov.
Bajocian, *niortensis*; Holotype; See CXCH

Fig. 1

Fig. 1a

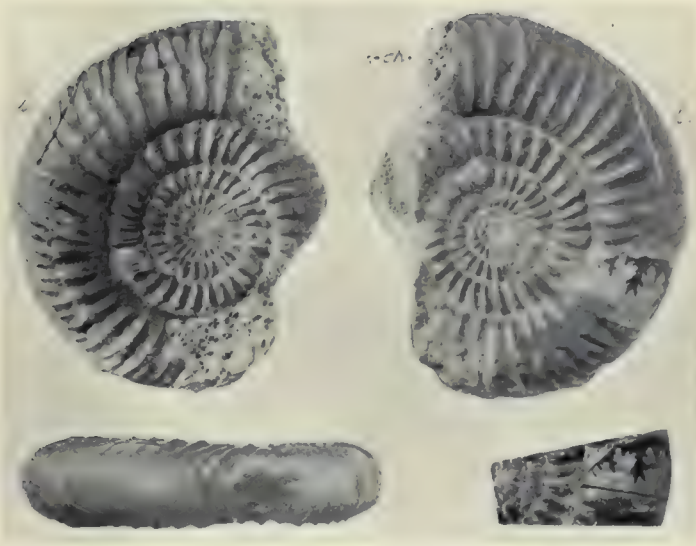
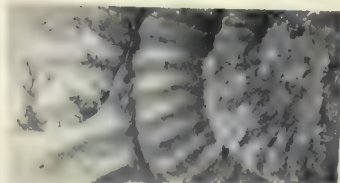


Fig. 2

Fig. 1b

PARKINSONIA CAUMONTII, ally of, S. BUCKMAN, 1893
 Q.J.G.S., XLIX, 497; "Lower Clatcombe (§ XIII, 7), Sherborne,
 "Dorset, *Niortensis* η"; *l*, dorsal lappet of mouth
 S.B. Coll. 3789; S. 50, 26, 27, 50; c. 36 ribs; max. c. 75

CAUMONTISPHINCTES NODATUS, nov.
 Bajocian, *niortensis*; Holotype. See CCXLI

Fig. 2 $\times 0.35$ Fig. 1a $\times 0.37$ Fig. 1a $\times 0.37$

AMMONITES TRIPLEX; S. BUCKMAN, 1920, p. 27
 Non *A. triplex*, Zieten, 1831, VIII, 3; non *A. triplex*, J. de C. Sow., 1835
 "Temple Cowley," near Oxford; Low. Calcareous Grit; S.B. Coll. 2778
 S. 287, 21, 23.5 (22.5), 61.5; 37 ribs; max. c. 460

KRANAOSPHINCTES KRANAUS, NOV.
 Argovian, c. *Goliathiceras*; Genotype, Holotype

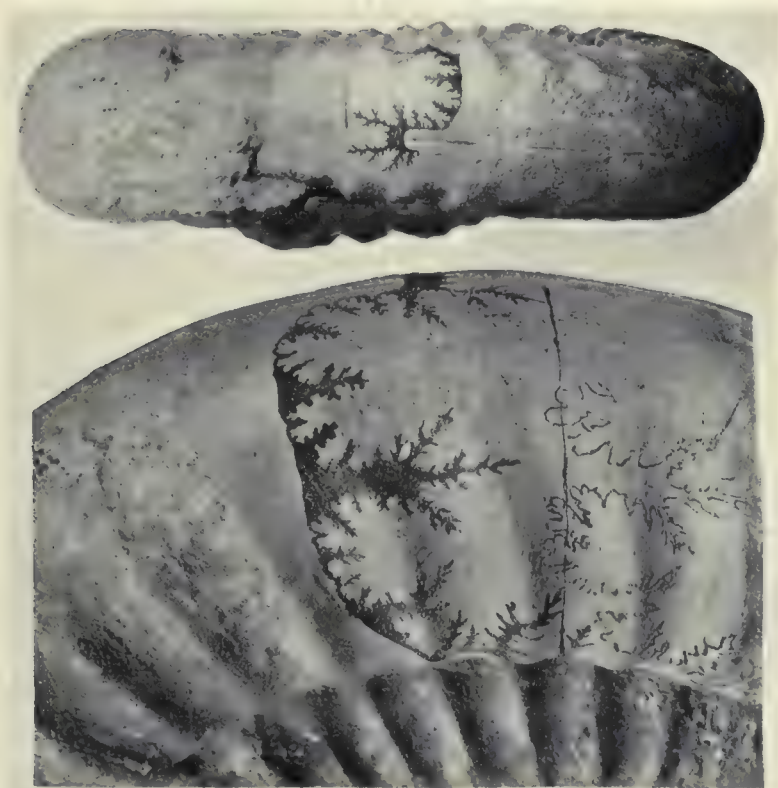
Fig. 1, $\times 0.35$ 

Fig. 2, N.S.

AMMONITES TRIPLEX; S. BUCKMAN, 1920, p. 27
" Temple Cowley," S.W. of Shotover Hill, near Oxford
Lower Calc. Grit (Littlemore Sands, a dogger near top)
S.B. Coll. (ex workman) 2778; LI at 47 mm., 57 per cent.

KRANAOSPHINCTES KRANAUS, nov.
Argovian, c. *Goliathiceras*; Genotype, Holotype

Fig. 1

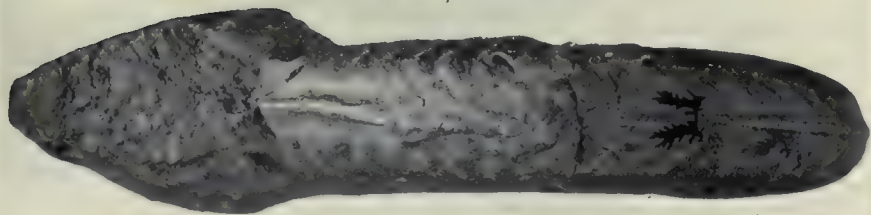


Fig. 2

x 0.85

AMMONITES FABALIS, SIMPSON, 1855, Holotype
 Pp. 77, 78; "Whitby, [Yorkshire]; Lias" label on specimen
 [Peak, near Whitby; U. Lias, Peak Shales]; Whitby Museum, No. 774
 ♂ 139 (118), 32, 24, 43, — keel; max. c. 170

PHYMATOCERAS FABALE, SIMPSON SP.
 Whitbian, *variabilis*. See 85

Fig. 1

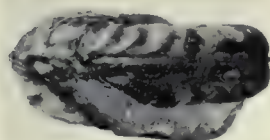


Fig. 2

AMMONITES MURLEYI, J. BUCKMAN in Moxon, Paratype
"Dumbleton, Glos.; Upper Lias 3, Fissile Marl"
[Fish and Insect Bed], Geol. Chelt., New Ed., 1844, pp. 36, 90
S.B., ex J.B., Coll. 2190; S. 34, 31, 32, 44; size 37; max. c. 40

MURLEYICERAS FORTE, NOV.
Whitbian, *murleyi*; Holotype. See CCXVI

Fig. 3



Fig. 1



Fig. 2

"ERYCITES cf. GONIONOTUS"

" Found on Rockery, Bradford Abbas, Dorset [ex Louse Hill ?]
 "[Inf. Ool. *murchisonae* zone;]" S. B. Coll. 238; Fig. 2, venter (rubbing)
 S. 65, 34, 37, 37; 114, 31'5, 24'5, 43; max. 120

ERYCITES PARTSCHI, PRINZ 1904
 Aalenian, *bradfordensis* (*Erycites*). Cf. CCXXXVI

Fig. 2,
N.S.

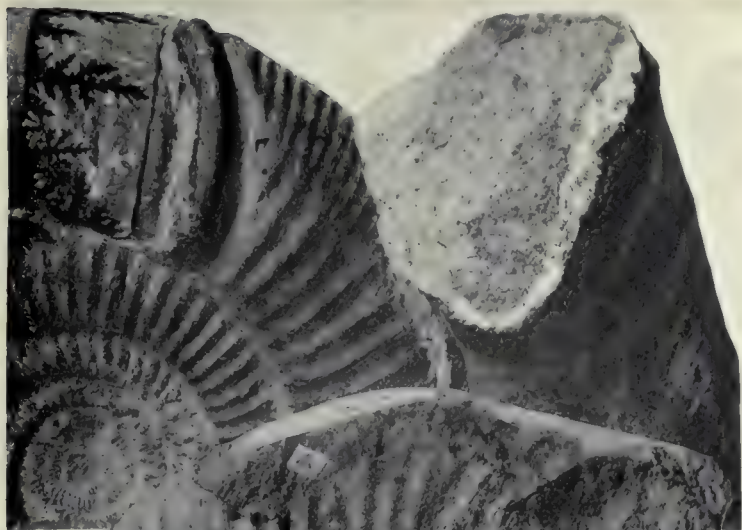


Fig. 1
x 0.67



"*PERISPHINCTES MARTINSII*"

"Vetney Cross, Bridport, Dorset; I.O." [Shell Bed]
S.B., ex Darell, Coll. 1241; S. 105, 28.5, 28.5, 49.5
S. 159, 27, 22.5, 51; 69 ribs; max. 166. Cf. CC

STOMPHOSPHINCTES STOMPHUS, nov.
Eningenian, *Garantiana*; Genotype, Holotype



Fig. 2
N.S.

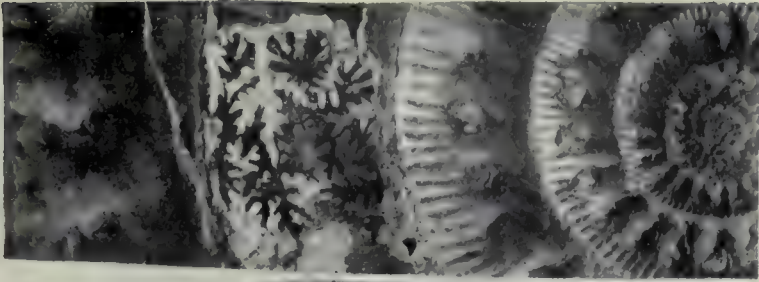


Fig. 1
× 0.53



"STEPHANOCERAS BAYLEANUM"

"[Sandford Lane], near Sherborne, Dorset; I.O." Cf. CCXXX
[Foss. Bed, upper part], (Q.J.G.S., XLIX, 1893, 492, § IX, 6a)
S.B., ex Darell, Coll., 1095; S. 219, 19, 18, 66; 38 ribs; max. 223

SKIROCERAS MACRUM, QUENSTEDT SP.

Bajocian, *sauzei*; [Genolectot., Quen., Schwäb., LXV, II]

Fig. 1

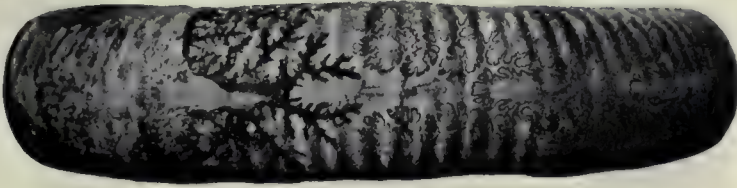


Fig. 2

"SKIRROCERAS MACRUM"

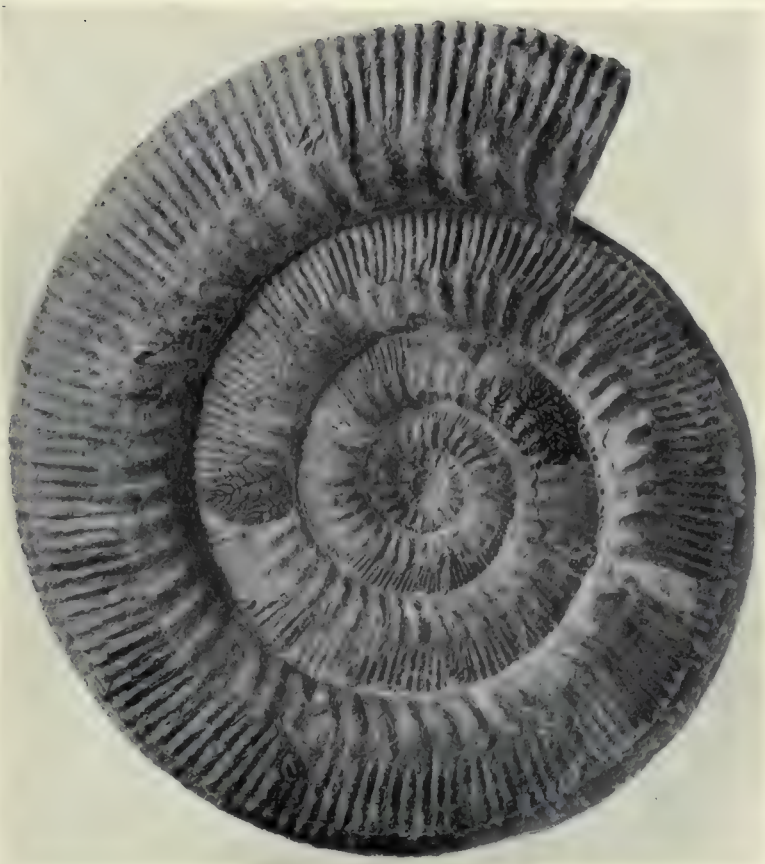
[Sunny Hill, Cole, Bruton, Som. ; I.O., *Pecten* Bed]

Cf. L. Richardson, Q.J.G.S., LXXI, 1916, 497, § 36, Bed 10
J.W.T. Coll. ; S. 106, 21'5; 23'5, 57 ; 29 ribs ; max. c. 180 +

SKOLEKOSTEPHANUS SKOLEX, nov.

Bajocian, *sauzei* ; Genotype, Holotype. Cf. CCXLVIII





X 0.54

STEPHEOCERAS FREYCINETI; S. BUCKMAN, 1910, cit. spec.
'South Dorset'; Q.J.G.S. LXVI, 73, § II, 5
[Burton Bradstock], "near Bridport, Dorset; I.O.," [Red Bed]
S.B. Coll. 1510; S. 208, 29, 22.5, 56; 53 ribs; max. 290 +

RHYTOSTEPHANUS RHYTUS, nov.
Bajocian, *sauzei*; Genotype, Holotype



Fig. 1

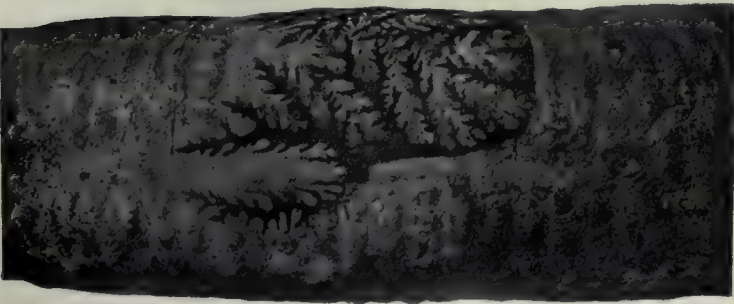
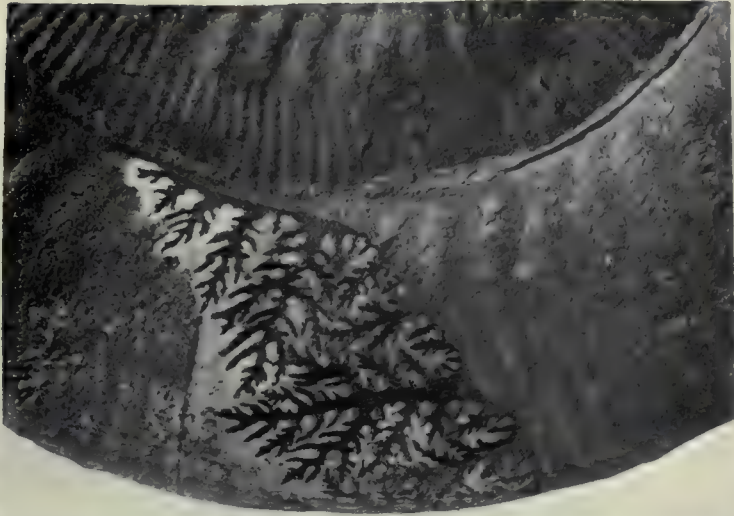


Fig. 2

STEPHEOCERAS FREYCINETI; S. BUCKMAN, 1910, cit. spec.
 [Burton Bradstock] "near Bridport, Dorset; I.O.," [Red Bed]
 S.B. Coll. (purch.) 1510; S.l. nat. size. Cf. CCXXXVIII

RHYTOSTEPHANUS RHYTUS, nov.
 Bajocian, *sauzei*; Genotype, Holotype



Fig. 1



Fig. 2

"AMMONITES KOENIGI"

[Chippenham, Wiltshire; Kellaways Clay (a)]
J.W.T. Coll.; S. 71, 38, 29, 42; max. c. 95

PROPLANULITES FABRICATUS, S. BUCKMAN, p. 36
Callovian, *koenigi* (*majesticus*); Holotype. See CCXXXII



Fig. 1, $\times 0.62$ Fig. 2, $\times 0.52$ 

"AMMONITES KOENIGI"

"Chippenham, Wiltshire; Oxford Clay" [Kell. Clay (b)]
Geological Survey, England, 30741; S. 147, 38.5, 25, 30
S. 236, 37.5, 25.5, 35; max. c. 465 +

PROPLANULITES BASILEUS, S. BUCKMAN, p. 34
Callovian, *koenigi* [*basileus*]; Holotype. See CCLI



X 0.51



AMMONITES BAKERIÆ; H. B. Woodward, 1895, cit. spec.
Mid. Ool. Engl.; Mem. Geol. Surv. V, 30; "S.W. of Little Somerford,
"Malmesbury, Wilts; Kell. Rock [e]"; Geol. Surv. Engl. 4744
S. 141, 39, 27 (25), 33; 238, 36, 28, 36; c. 23 ribs; max. c. 435

CRASSIPLANULITES CRASSIRUGA, S. Buckman, p. 42
Callovian, post-*koenigi* (*Crassiplanulites*); Holotype. See CCXXVIII



Fig. 1



Fig. 2

"AMMONITES GOWERIANUS"

"Chippenham, Wilts; Oxford Clay," [Kellaways Clay (a)]
Geological Survey, England, 30456; S. 47, 38, 53, 30
S. 61, 39.5, 54, 33; S. 85, 36.5, 39, 35; max. 85

GOWERICERAS METORCHUM, nov.

Callovian, *koenigi* (*majesticus*); Genotype, Holotype



Fig. 1

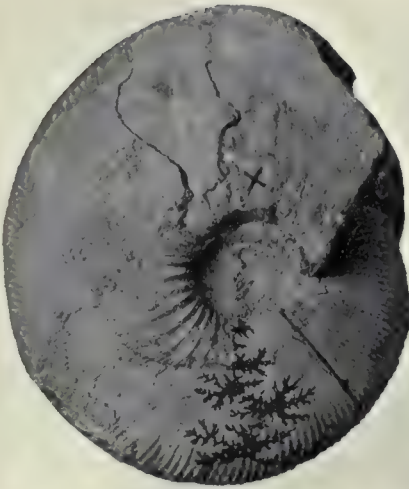


Fig. 2



Fig. 3

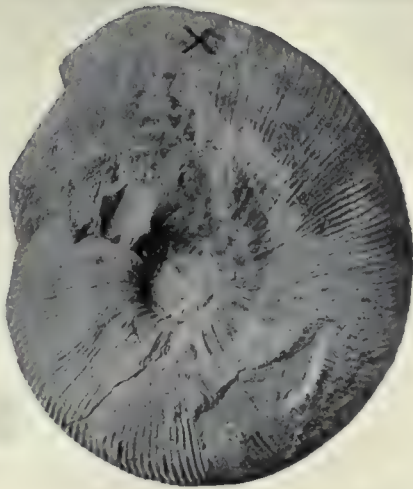


Fig. 1a

"AMMONITES CALLOVIENSIS"

[Kellaways, Wiltshire; Kell. Rock], impression of a *Rhynchonella*
J.W.T. Coll.; S. 38, 46, 42, 21; 65, 47.5, 41.5, 17; max. c. 85

SIGALOCERAS MICANS, NOV.

Callovian, *calloviense* (*Crassioplanulites*); Holotype. Cf. CCLIV



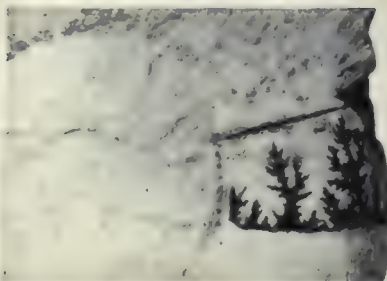
X 0.23



AMMONITES GIGANTEUS, J. SOWERBY, 1816, Chorotype
(Min. Conch. II, 55; CXXVI); Barrel Hill, Long Crendon, Bucks
Portl. Stone [Lime Bed]; S.B. Coll. 2957, pres. H. Dodwell, J.P.
S. 507, 27.5, 29, 53; 60 ribs; max. c. 540

GIGANTITES GIGANTEUS, J. SOWERBY SP.
Portlandian, *Gigantites*; Genotype. Cf. CCXXXI



Fig. 1, $\times 0.32$ Fig. 2, $\times 0.23$ Fig. 3, $\times 0.87$

AMMONITES GIGANTEUS, J. SOWERBY, 1816, Chorotype
 Portland Stone, ["The Hard Lime or Blue Bed"
 The 4th Bed down in the "Creamy Limestones"]
 S.B. Coll. 2957; Fig. 3, EL, LI, L2 about equal length

GIGANTITES GIGANTEUS, J. SOWERBY SP.
 Portlandian, *Gigantites*; Genotype





X 0.19

"AMMONITES GIGANTEUS"

Scotsgrove, Haddenham, Bucks; Portland Stone
Building Stone; S.B. Coll. 3485, pres. Capt. Ashton
Body-chamber with signs of month; S. 644, 29, 23.5, 46

BRIAREITES POLYMELES, NOV.

Portlandian, *Titanites*; Genotype, Holotype. Cf. CCLVI



Fig. 2, $\times 0.25$ Fig. 1, $\times 0.22$ 

"AMMONITES GIGANTEUS"

S.B. Coll. 3485; without outer quarter whorl

S. 310, 35, 33, 38; 527, 31, 28, 44; 56 ribs

S. 644, 29, 23.5, 46 (Pl. CCLVII A). Cf. CCXXXI

BRIAREITES POLYMELES, NOV.

Portlandian, *Titanites*; Genotype, Holotype



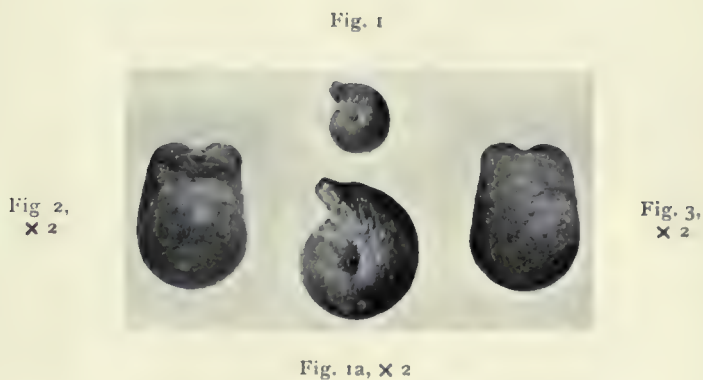


"AMMONITES GIGANTEUS"

S.B. Coll. 3485; Suture-line with long, florid L₁,
with rather long L₂, but not so long as L₁,
and recurved umbilical portion. Nat. size

BRIAREITES POLYMELES, nov.
Portlandian, *Titanites*; Genotype, Holotype

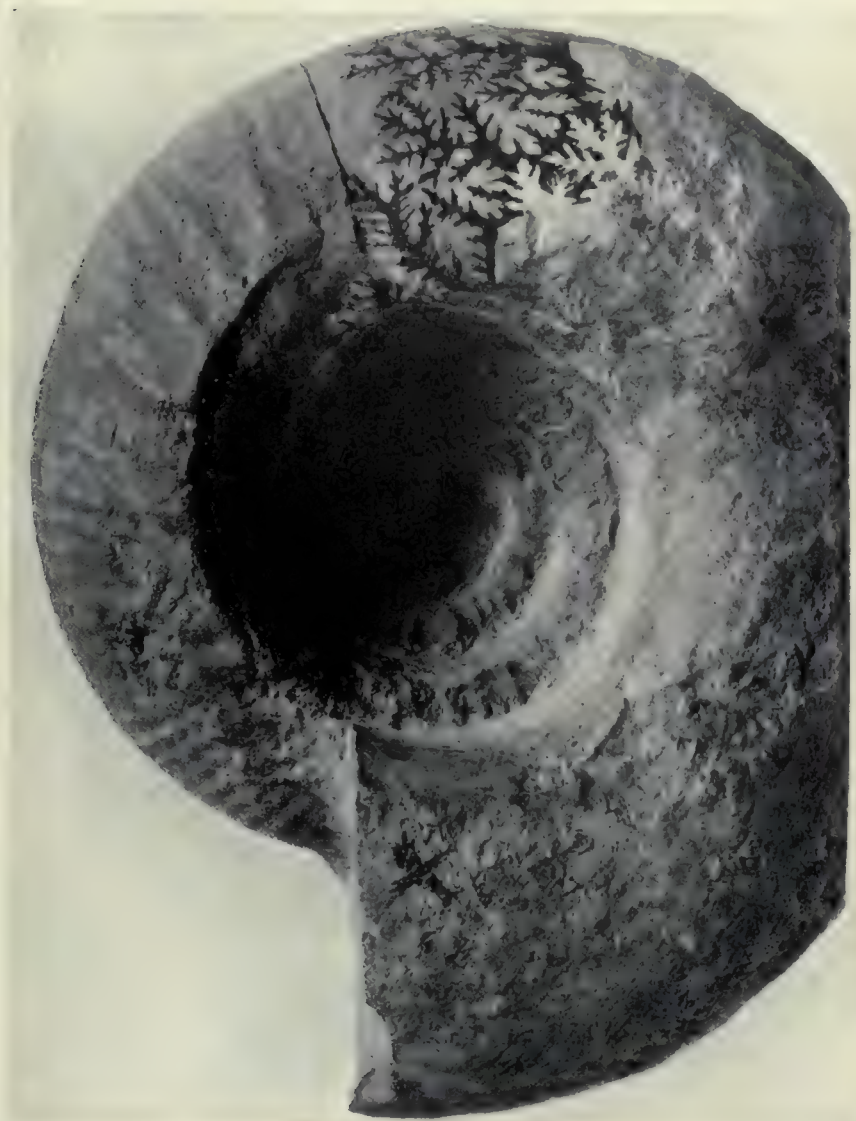




SPHÆROCERAS BRONGNIARTI; S. BUCKMAN, 1881, cit. spec.
 Q.J.G.S., XXXVII, 597; "Sherborne, Dorset, I.O. Humph. z."
 S.B., ex J.B., Coll. 3502; S. (5·75, 57, 103, —) ?; 8·5, 50, 73, 17
 Max. 9. Perhaps one of the smallest Jurassic Ammonites

SPHÆROCERAS TUTTHUM, NOV.
 Bajocian, *niortensis*; Holotype

X 0.95



AMMONITES SUB-CONTRACTUS, J. BUCKMAN, 1875, cit. spec. ?
'Ceph. Bed' ; Proc. Som. Arch. & N.H. Soc., XX, 149
"Hall's Quarry, Bradford Abbas, Dorset ; Fuller's Earth Rock"
Hall's Qy. = Vicarage Qy., S.B., Q.J.G.S., XLIX, 1893, 486, § III, [2 ?])

ZIGZAGICERAS POLLUBRUM, NOV.
Eningenian, *fusca* (*pollubrum*) ; Holotype. Cf. CLIII

Fig. 1

Fig. 2



AMMONITES SUB-CONTRACTUS, J. BUCKMAN, 1875, cit. spec. ?

" Found in B. A. village, from top beds ? " Orig. lab.

[Hall's Qy.], Bradford Abbas, Top beds [I.O.] ; S.B., ex Darell, Coll. 1154

S. 91, 32, 54, 43 ; 153, 36, 54, 38 ; max. c. 255

ZIGZAGICERAS ~~POLLUBRUM~~, NOV.

Eningenian, *fusca*, (*pollubrum*) ; Holotype



Fig. 2

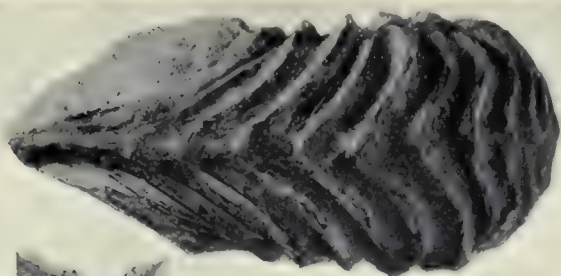


Fig. 1a

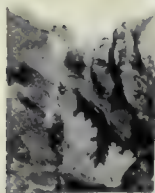


Fig. 1

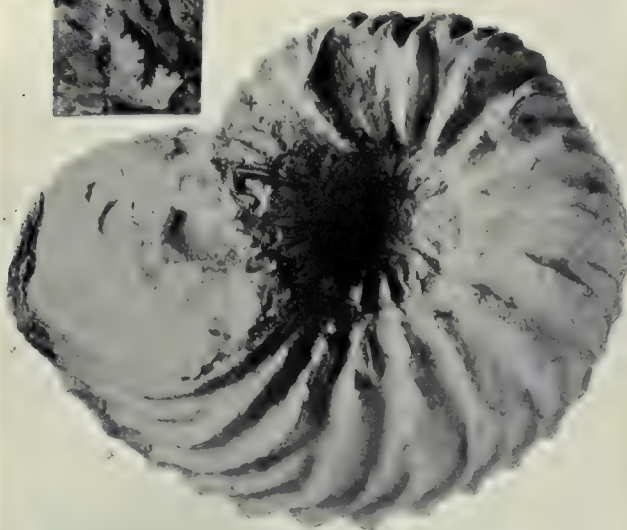


Fig. 3



AMMONITES OMPHALOIDES ; T. H. HUXLEY, 1865, cit. spec.
 Cat. Foss. Coll. Mus. Pract. Geol., p. 241 ; "Weymouth, Dorset
 "Oxford Clay," bluish calcareous ; Geol. Surv. Engl. Coll., 30371
 S. 51, 43, 63 (57), 31·5 ; 68, 43, 53 (45), 30 ; max. c. 79. R., slightly restored

SAGITTICERAS SAGITTA, S. BUCKMAN, 1920, p. 19
 Argovian, pre-Goliathiceras ; Genotype, Holotype. Cf. CXCVIII



Fig. 1

Fig. 2



Fig. 3

AMMONITES BINATUS BEAN MS. (LECKENBY, 1859, Syntype)
 Q.J.G.S., XV, pp. 7, 10; "The Castle Rock, Scarborough, Yorkshire"
 "Kell. Rock," (grey-brown sandstone); Sedgwick Mus., Cambridge
 S. 54, 30, 24, 42.5; 82, 33, 25.5, 40? max. c. 120

BINATISPHINCTES BINATUS, BEAN-LECKENBY SP.
 Callovian, *athleta*; Genotype, Lectotype. Cf. CLXXXVI



Fig. 2a

Fig. 1



Fig. 2

AMMONITES BINATUS, BEAN MS. (LECKENBY, 1859, Syntype)
 Q.J.G.S., XV, pp. 7, 10; "The Castle Rock, Scarborough, Yorkshire"
 "Kell. Rock"; (grey-brown sandstone); Sedgwick Mus., Cambridge
 S. 33, 30, 29, 44; 63, 32, 25, 41; max. c. 110

BINATISPHINCTES BINATUS, BEAN-LECKENBY SP.
 Callovian, *athleta*; Paralectotype



Fig. 1

Fig. 2



Fig. 2a

Fig. 2b

AMMONITES BINATUS, BEAN MS. (LECKENBY, 1859, Syntype)
 Q.J.G.S., XV, 7, 10; "The Castle Rock, Scarborough, Yorkshire"
 "Kell. Rock" (brown and irony, with col. grs.); Sedgwick M., Cambridge
 S. 52, 24, 26, 54, c. 38 ribs; S. 73, 29, 25, 52; 28 ribs; max. c. 85

HAMULISPINCTES HAMULATUS, NOV.
 Callovian, *athleta*; Genotype, Holotype. Cf. CCLXI



Fig. 1

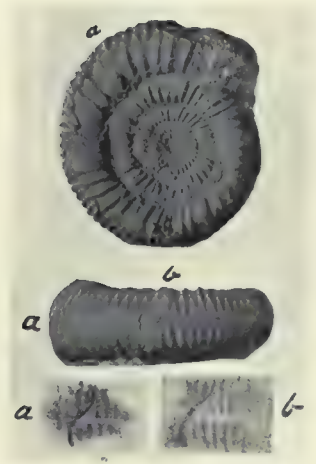


Fig. 2



Fig. 2a

Fig. 2b

AMMONITES BINATUS, BEAN MS. (Leckenby, 1859, Syntype)
 Q.J.G.S. XV, 7, 10; "The Castle Rock, Scarborough, Yorkshire"
 "Kell. Rock" (grey sandst., with irony pieces); Sedg. M., Cambridge
 S. 30, 25, 32, 55; 39 ribs; 6 parabolic, on last whorl

HAMULISPHINCTES HAMULATUS, NOV.
 Callovian, *athleta*; Paratype



Fig. 3

Fig. 4

Fig. 1

Fig. 2



AMMONITES BINATUS, BEAN MS. (LECKENBY, 1859, Syntype)
 Q.J.G.S., XV, 7, 10; "The Castle Rock, Scarborough, Yorkshire"
 "Kell. Rock" (hard grey sandstone); Sedgwick M., Cambridge
 S. 38, 27.5, 26, 47; 35 ribs; S. 65, 33, 29, 44; 26 ribs; max. 66

HAMULISPINCTES AURICULA, nov.
 Callovian, *athleta*; Holotype. See CCLXII



Fig. 3



Fig. 2

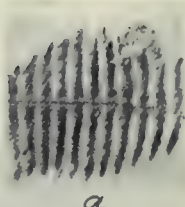


Fig. 1



Cf. *PERISPINCTES* INGLOS, DE GREGORIO
 "Bradford Abbas, Dorset. Inf. Ool., Foss. Bed [Mid. part]"
 S.B., ex J.B., Coll. 3570; S. 45·5, 32, 52, 43; 67, 26·5, 36, 51; Max. 72
 F. 3, Id., 3571, Mouth, raised band. See *Perisph. Docid.* III, 28

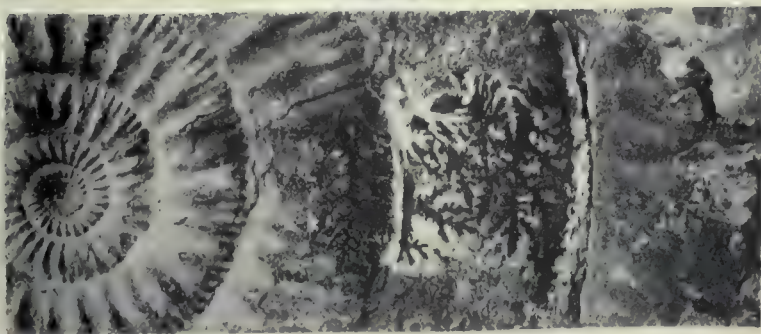
DOCIDOCERAS PLANULATUM, NOV.
 Bajocian, *discites* (*Eudmetoceras*); Holotype. See CXXXIII



Fig. 1,
x 0.38



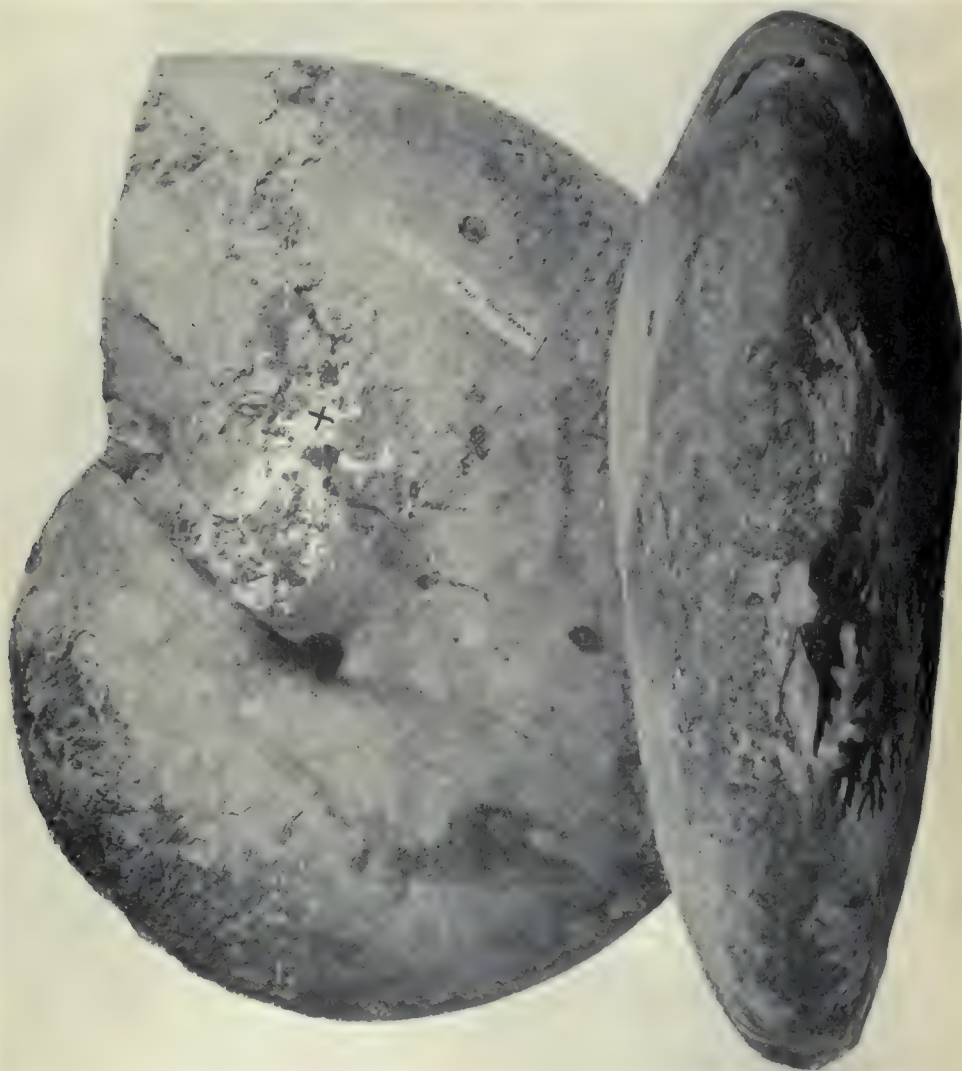
Fig. 2
N.S.



STEPHANOCERAS of BAYLEANUM-type, S. BUCKMAN, 1896, cit. spec. Q.J.G.S., LII, 680, § IV, 5; "Dundry, Somerset. I.O., ironshot bed" S. B. Coll. 2174; S. 129, 24, 21.5, 56; 41 ribs; S. 218, 13.5, 15, 75 S. 277, 14, 14.5, 75; c. 85 ribs; max. 282. Body-ch. $2\frac{1}{2}$ whorls

ÆCOSTEPHANUS DOLICHÆCUS, nov.
Bajocian, *sauzei*; Genotype, Holotype. Cf. CCL

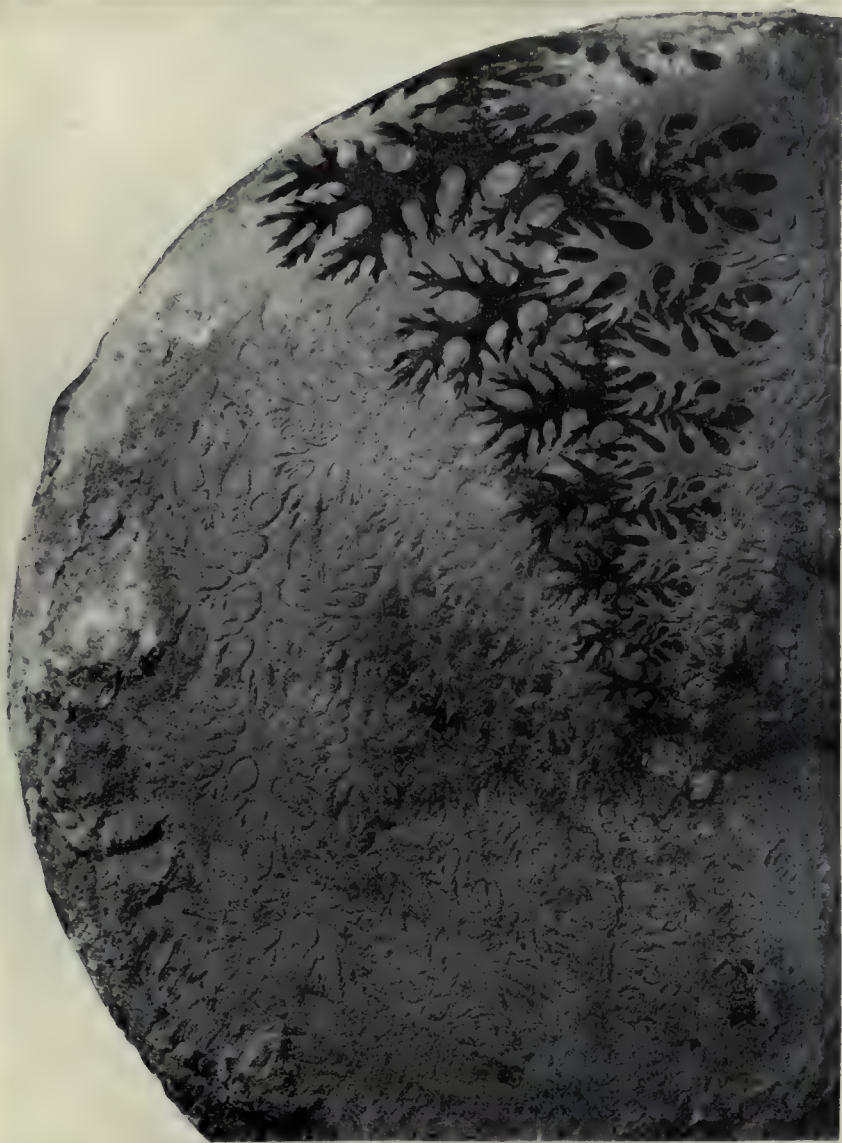


Fig. 1. $\times 0.52$ Fig. 2 $\times 0.62$ 

PHYLLOCERAS aff. VILPUM, DE GREGORIO
 "Stoford, Somerset; Sandrook of Yeovil Sands, *moorei*"
 S. B. Coll. 711; S. 121, 59, 34, (4'25 ?)
 S. 252, 59, 32'5, 3; max. c. 390

XEINOPHYLLOCERAS XEINUS, NOV.
 Yeovilian, *moorei*; Genotype, Holotype. Cf. CCXXXIII





PHYLLOCERAS aff. VILPUM, DE GREGORIO
"Stoford, Somerset; Sandrock of Yeovil Sands, *moorei*"
(See S. B., 'Sands'; Q.J.G.S., XLV, 1889, 450, § VIII)
Cast shows slight constrictions at intervals. EL very short

XEINOPHYLLOCERAS XEINUS, nov.
Yeovilian, *moorei*; Genotype, Holotype



QE
807
A5B8
v.3

Buckman, Sydney Savory
Yorkshire type ammonites

P&ASci.

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